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Nuclear weapons testing and nuclear explosions for peaceful purposes in the USSR (1949–1990)

Introduction

The chapter presents the characteristics of **all** nuclear explosions conducted by the USSR. The nuclear tests under consideration are classified by time and place of the test, type of explosion, test purposes, and energy release category.

The list of nuclear explosions carried out includes experiments with nuclear charges in which nuclear energy release close to zero was realized as a result of unforeseen accidents or targeted research into the behavior of nuclear charges during the simulation of emergency situations.

The identification of the event as a nuclear explosion during air and underwater tests in relation to the place and time of their conduct is obvious, since the detonation of each such device was carried out individually.

In a similar identification of events with respect to underground nuclear explosions, we proceeded from the accepted terminology of "underground nuclear weapons test" and "**nuclear explosion**" for peaceful purposes, defined in the Treaty between the USSR and the USA on the Limitation of Underground Nuclear Weapon Tests (1974) and the Protocol to it, the Treaty between the USSR and the USA on Underground Nuclear Explosions for Peaceful Purposes (1976) .

According to these documents, regarding nuclear weapons testing:

- the term "**explosion**" means the release of nuclear energy from a nuclear container;
- the term "**underground nuclear weapon test**" means either a single underground nuclear explosion conducted at a test site or two or more underground nuclear explosions conducted at a test site within an area enclosed by a circle two kilometers in diameter and within a total time period of 0.1 second. The yield of a test is the sum of the yields of all explosions in that test.*

With regard to nuclear explosions for peaceful purposes:

- the term "**explosion**" means any underground nuclear explosion for peaceful purposes;
- The term "**group explosion**" means two or more separate explosions for which the time interval between successive separate explosions does not exceed 5 seconds and for which the emplacement points of all explosive devices can be interconnected by straight line segments, each of which connects two emplacement points and each of which does not exceed 40 kilometres.

The proposed list does not include experiments with nuclear energy release of less than (about) 1 ton of TNT equivalent, with the exception of similar experiments with an unforeseen result and experiments for the purposeful study of emergency situations. Such experiments are laboratory explosive experiments with fissile materials and should not fall under the definition of "**nuclear weapons testing**". According to the American classification, such experiments are called hydronuclear. In the USSR, about 90 such experiments were conducted, mainly with nuclear energy release not exceeding or significantly less than 100 kg of TNT equivalent.

It should also be noted that the proposed list, naturally, does not include experiments with fissionable and nuclear materials that were conducted at nuclear testing sites and not related to nuclear explosions of charges, the implementation of explosive chain reactions and chain reactions in general. This category of experiments according to the American classification is called

hydrodynamic experiments. This category of work pertains to laboratory studies of the properties of materials and the characteristics of non-nuclear processes.

** Further in the text, the conventional name of a group explosion is used in the case when more than one nuclear charge or nuclear device was detonated in a nuclear test.*

Classification of nuclear tests of the USSR

These materials adopt the following classification of nuclear explosions according to the purposes for which they are carried out:

SYaO — tests in the interests of creating or improving nuclear weapons;
IAR — research of emergency modes and emergency situations;
IPF — research of damaging factors of nuclear weapons and their impact on military and civilian facilities;
FMI — fundamental and methodological research;
VU — military exercises under nuclear explosion conditions;
PV — industrial nuclear explosions for peaceful purposes and development of technologies for conducting PNEs;
OPZ — development of industrial charges for the production of nuclear explosions for peaceful purposes.

Although in some cases several goals were pursued during the tests, one was used for their identification, which was the main one for a given experiment.

The following energy ranges were used to determine the category of nuclear energy release of the explosion:

< **0.001** — no nuclear energy release or a nuclear explosion with an energy release of less than 1 ton of TNT equivalent;
0.001–20 — nuclear explosions with an energy release in the range from 1 ton to 20 kt ;
20–150 — nuclear explosions with an energy release in the range from 20 to 150 kt ;
150–1500 — nuclear explosions with an energy release in the range from 150 to 1500 kt;
1500–10000 — nuclear explosions with an energy release in the range from 1500 to 10000 kt;
≥ 10000 — nuclear explosions with an energy release of more than 10000 kt.

According to the conditions for conducting nuclear tests in the USSR, the following classification was adopted:

- **ground explosion** - a nuclear test on the surface of the earth or on a test tower*. According to physical criteria related to the radioecological impact of the explosion, the category of ground explosions includes all nuclear tests with a reduced detonation height of $\frac{1}{3}$ no more than 35 m/kt ;
- **air burst** - a nuclear test in the atmosphere with a reduced detonation altitude of $\frac{1}{3}$ at least 100 m/kt ** (under such conditions, the expanding fireball does not touch the surface of the earth) . This category separately identifies high-altitude explosions for which the size of the fireball is comparable to the characteristic size of the atmospheric heterogeneity (approximately 7 kilometers) ; this category also includes space explosions;
- **underwater explosion** - a nuclear test in which the explosive device was located under the surface of the water;
- **underground explosion** - a nuclear test in which the explosive device was located below the surface of the ground.

Underground blasts are classified according to the type of mine working in which the explosive device was placed: horizontal working - adit,*** vertical working - borehole.

In 1950 and 1952, there were breaks in nuclear testing in the USSR due to the specifics of the initial stage of work on the nuclear weapons program. In 1959–1960 and until August 1, 1961 , the USSR did not conduct nuclear testing, participating in a moratorium on nuclear testing together with the USA and Great Britain. In 1963 and until March 15, 1964, the USSR did not conduct nuclear testing in connection with the preparation for the conclusion of the 1963 Treaty on the Ban of Nuclear Tests in Three Environments and the transition to the implementation of the underground nuclear testing

program. From August 1985 to February 1987 and from November 1989 to October 1990 and later, the USSR did not conduct nuclear testing, participating in moratoriums on their conduct.

The first nuclear explosion of the USSR was carried out on August 29, 1949, and the last on October 24, 1990, thus the nuclear testing program of the USSR lasted for 41 years, 1 month and 26 days.

The first nuclear explosion was carried out at the Semipalatinsk test site, and the last nuclear explosion of the USSR was carried out at the Novaya Zemlya Northern Test Site.

The geographic names of the areas where nuclear tests were conducted correspond to the names that existed during the Soviet era.

** The nuclear explosion of 10/30/54 (air bomb) detonated at a low altitude also falls into this category.*

*** This category includes the nuclear explosions of 10/26/54 and 09/10/56^{1/3}, carried out at a reduced altitude of $H \sim 80 \text{ m/kt}$ and in the altitude range (35–100) m/kt.*

**** This category includes the peaceful nuclear explosion of September 16, 1979, which took place in a coal mine.*

Characteristics of nuclear tests by time and conditions of their implementation

The USSR nuclear testing program includes 715 nuclear tests, including 221 nuclear tests before the 1963 Treaty Banning Nuclear Tests in Three Environments came into effect. A list of all nuclear tests and explosions is given in strict chronological order in **Appendix 1**, and peaceful nuclear explosions in **Appendix 2**.

Table 3.1 and Fig. 3.1 show the distribution of the number of nuclear tests conducted by year.

Table 3.1. Distribution of the number of nuclear tests of the USSR by year

Year	1949	1951	1953	1954	1955	1956	1957	1958	1961	1962	1964	1965
N_{and}	1	2	5	10	6	9	16	34	59	79	9	14
Year	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
N_{and}	18	17	17	19	16	23	24	17	21	19	21	24
Year	1978	1979	1980	1981	1982	1983	1984	1985	1987	1988	1989	1990
N_{and}	31	31	24	21	19	25	27	10	32	16	7	1

Note: N_{and} is the number of nuclear tests.

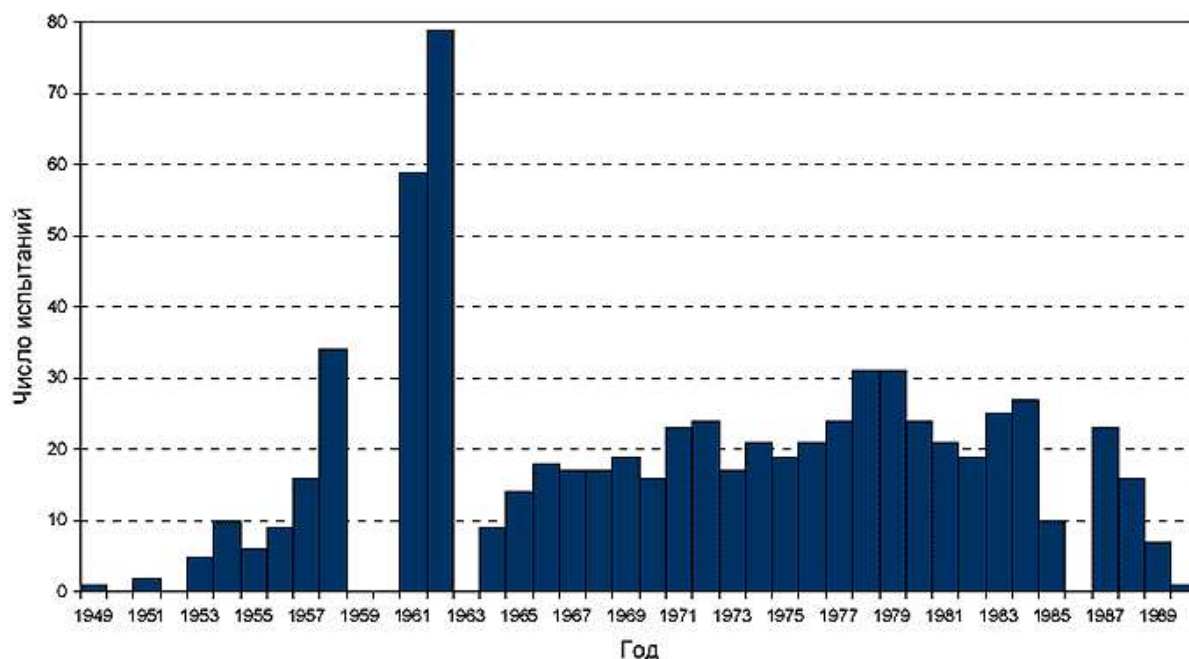


Fig. 3-1. Nuclear tests and explosions of the USSR

The absolute maximum in the intensity of nuclear tests occurred in 1962 - 79 tests; the average annual number of nuclear tests by the years in which they were conducted is about 20 tests.

Table 3.2 and Fig. 3.2 show the distribution of the number of nuclear tests according to the conditions under which they were conducted.

Table 3.2. Distribution of the number of nuclear tests of the USSR by the conditions of their implementation

Terms and Conditions	Ground explosion	Air burst	High-altitude and space explosions	Underwater and above-water explosions	Underground explosion*		Total
					Gallery	Well	
<i>N</i>_{and}	32	177	1+4	3+2	245	251	715

* This number includes 5 nuclear tests of the USSR for emission.

All nuclear explosions of the first four categories listed in **Table 3.2** and two underground explosions were conducted before 1963 (the entry into force of the Three -Environment Nuclear Test Ban Treaty) ; 494 tests were conducted in mines in 1964–1990 .

The first above-ground nuclear explosion was conducted on August 29, 1949, at the Semipalatinsk test site. This was the first nuclear test of the USSR and the first above-ground explosion of the USSR. The last above-ground nuclear explosion was conducted on December 24, 1962, at the same test site .

The first airborne nuclear explosion was conducted on October 18, 1951, at the Semipalatinsk Test Site, and the last airborne nuclear explosion was conducted on December 25, 1962, at the Novaya Zemlya Northern Test Site. This was the last nuclear test by the USSR before the Three-Environment Nuclear Test Ban Treaty came into effect.

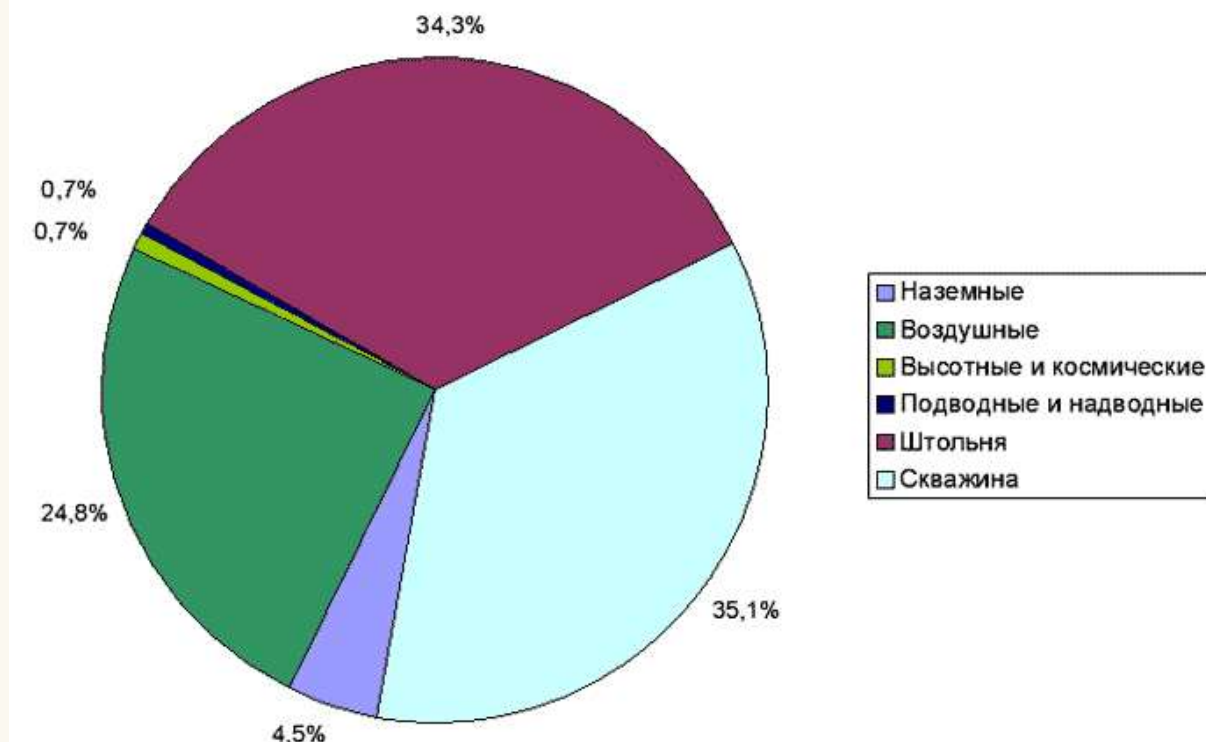


Fig. 3–2. Distribution of nuclear tests by conditions of their implementation

The first high-altitude (space) nuclear explosion was conducted on October 27, 1961. The nuclear charge was launched into space by a rocket from the Kapustin Yar missile test site. The last high-altitude nuclear explosion was conducted on November 1, 1962.

Five nuclear explosions were classified as nuclear explosions in water or above the water surface, the first of which was carried out on September 21, 1955, and the last on August 27, 1962 at the Novaya Zemlya Northern Test Site.

The first underground nuclear explosion was conducted on October 11, 1961 at the Semipalatinsk test site, and the last underground nuclear explosion in a mine was conducted on October 24, 1990 at the Novaya Zemlya Northern Test Site. This was the last nuclear explosion of the USSR.

Characteristics of nuclear tests according to the purposes of their implementation

In accordance with the accepted classification, nuclear tests of the USSR can be divided into seven categories according to the purpose for which they were conducted (**Table 3.3**).

Table 3.3. Distribution of the number of nuclear tests of the USSR by the purposes for which they were conducted

Target	XIAO	IAR	IPF	FMI	Higher School of Economics	PV	OPZ	Total
<i>N_{and}</i>	445	25	52	36*	1	124	32	715

* Including the experience of the SEC on 14.09.88.

According to this classification, approximately 69% of nuclear tests were conducted in the interests of improving nuclear weapons, studying the damaging factors of a nuclear explosion and their impact (including military exercises).

In the interests of research into emergency situations, for fundamental and applied research (including the joint Soviet-American experiment of 14.09.88), 8.8% of the USSR's nuclear tests were conducted.

In the interests of implementing the program for the peaceful use of nuclear explosions (industrial explosions and the development of nuclear charges for them), 22% of nuclear tests were conducted,

i.e. 1/5 of the USSR nuclear testing program was aimed at civilian purposes.

It should be emphasized that the adopted classification is to a certain extent conditional, since many nuclear tests were conducted simultaneously for different purposes. For example, the first nuclear test of the USSR on August 29, 1949 and the test of the first thermonuclear charge of the USSR on August 12, 1953 were conducted both in the interests of creating nuclear weapons of the USSR and for studying the action of damaging factors of a nuclear explosion. Both of these nuclear tests provided fundamental experimental information about the fundamental processes occurring in nuclear charges.

It is interesting to compare the distribution of the number of nuclear tests by target, given in **Table 3.3**, with a similar distribution of nuclear tests conducted before 1963, which is presented in **Table 3.4**.

Table 3.4. Distribution of the number of nuclear tests by purpose before 1963

Target	XIAO	IAR	IPF	FMI	Higher School of Economics	PV	OPZ	Total
<i>N</i>_{and}	181	11	17	11	1	0	0	221

The share of tests for the purposes of nuclear weapons, IPF, and VU was about 90% at that time, while 10% of nuclear tests were conducted in the interests of the IAR and FMI. The nuclear testing program for civilian purposes was not implemented during that period.

In the period 1964–1990, with the transition to underground testing, nuclear explosions for civilian purposes (PE and OPZ) took an important place; their share of the total number of nuclear tests conducted during this period of time was about 32%.

Distribution of nuclear tests by location

1. **Table 3.5** shows the distribution of USSR nuclear tests by location.

Table 3.5. Distribution of the number of nuclear tests of the USSR by location

Venue	SIP	SPNZ	RIP "Kapustin Yar"	Azgir site	Others	Total
<i>N</i>_{and}	456	130	10	17	102	715

82% of all nuclear tests in the USSR were conducted at nuclear test sites (64% at the Semipalatinsk Test Site and 18% at the Novaya Zemlya Northern Test Site), and 18% of nuclear tests were conducted outside of them.

2. A total of 456 nuclear tests were conducted at the Semipalatinsk test site. The first nuclear explosion at the Semipalatinsk test site was conducted on August 29, 1949 — this was the first nuclear explosion of the USSR. The last nuclear explosion at the Semipalatinsk test site was conducted on October 19, 1989.

During the period from 1949 to 1963, 118 nuclear explosions were conducted at the Semipalatinsk test site, which is 53.4% of the total number of nuclear tests during this period. During the period from 1964 to 1990, 338 nuclear tests were conducted at the Semipalatinsk test site, which is 68.4% of the total number of nuclear tests during this period.

Table 3.6 and Fig. 3.3 show the distribution of nuclear tests at the Semipalatinsk test site by year.

The average number of nuclear tests conducted annually at the Semipalatinsk Test Site is, according to **Table 3.6**, approximately 13 tests. The peak intensity of nuclear tests at the Semipalatinsk Test Site for the period 1949–1962 occurred in 1962 (40 tests), and for the period 1964–1989, in 1978 and 1979 (20 tests each). In the period up to 1963, approximately 26% of the total number of tests conducted at the Semipalatinsk Test Site were conducted at this test site.

Table 3.6. Distribution of the number of nuclear tests at the Semipalatinsk test site by year

Year	1949	1951	1953	1954	1955	1956	1957	1958	1961	1962	1964	1965
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N and	1	2	5	9	5	8	11	8	29	40	7	12
Year	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
N and	14	15	14	14	12	15	14	9	15	12	16	15
Year	1978	1979	1980	1981	1982	1983	1984	1985	1987	1988	1989	1990
N and	20	20	18	15	10	14	14	8	16	12	7	0

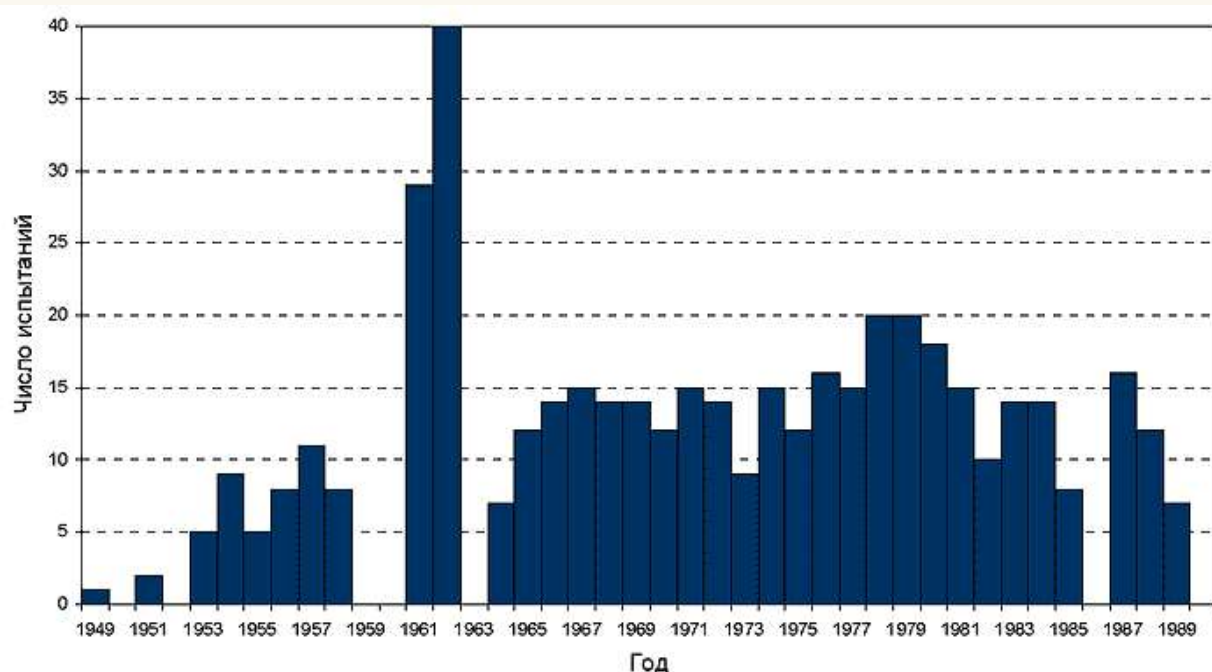


Fig. 3.3. Nuclear tests at the Semipalatinsk test site

Table 3.7 shows the distribution of the number of nuclear tests at the Semipalatinsk test site according to the conditions under which they were conducted.

Table 3.7. Distribution of the number of nuclear tests at the Semipalatinsk test site by the conditions under which they were conducted

Terms and Conditions	Ground explosion	Air burst	Underground explosion		Total
			Well	Gallery	
N and	30	86	209	131	456

The following was produced at the Semipalatinsk test site:

- 30 ground nuclear explosions out of a total of 32 explosions;
- 86 aerial nuclear explosions out of a total of 177 explosions;
- 340 explosions in mine workings out of a total of 496 explosions.

The first nuclear explosion at the Semipalatinsk test site in a tunnel was conducted on October 11, 1961 — this was the first Soviet underground nuclear explosion. The first nuclear explosion at the Semipalatinsk test site in a borehole was conducted on January 15, 1965 — this was the first Soviet underground nuclear explosion in a borehole.

The maximum intensity of nuclear explosions at the Semipalatinsk test site in adits occurred in 1966 (10 nuclear explosions per year) and 1978 (13 nuclear explosions per year), and in boreholes - in 1979 and 1984 (10 nuclear explosions per year).

Table 3.8 shows the distribution of the number of nuclear tests at the Semipalatinsk test site by test purpose.

Table 3.8. Distribution of the number of nuclear tests at the Semipalatinsk test site by test purposes

Target	XIAO	IAR	IPF	FMI	PV	OPZ	Total
1949–1990	330	25	36	27	7	31	456
1949–1963	100	11	2	5	0	0	118

Tests for the purposes of nuclear weapons and IPF accounted for 80% of the number of nuclear weapons conducted at the Semipalatinsk test site. The share of tests for the purposes of IAR and FMI accounts for 11.5% of tests, the share of PV and OPZ accounts for 8.5% of the number of tests at the Semipalatinsk test site.

3. A total of 130 nuclear tests were conducted at the Novaya Zemlya Northern Test Site. The first nuclear explosion at the Novaya Zemlya Island test site was conducted underwater on September 21, 1955; the first above-ground explosion at this test site was conducted on September 7, 1957. The last nuclear explosion at the Novaya Zemlya test site was conducted on October 24, 1990 — this was the last nuclear explosion in the USSR. Between 1955 and 1963, 91 nuclear tests were conducted at the Novaya Zemlya test site, and 39 nuclear tests between 1964 and 1990. This constitutes 41.2% of the total number of tests in 1949–1962 and 7.9% of the total number of nuclear tests in 1964–1990 .

Table 3.9 and Fig. 3.4 show the distribution of the number of nuclear tests conducted at the Novaya Zemlya Northern Test Site by year.

Table 3.9. Distribution of the number of nuclear tests at the Northern Test Site “Novaya Zemlya” by year

Year	1955	1957	1958	1961	1962	1964	1966	1967	1968	1969
<i>N</i>_{and}	1	4	24	26	36	2	2	1	1	1
Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
<i>N</i>_{and}	1	1	2	3	2	4	2	2	2	2
Year	1980	1981	1982	1983	1984	1987	1988	1990	Σ	-
<i>N</i>_{and}	1	1	1	2	2	1	2	1	130	-

The average number of nuclear tests at the SPNS is 4.65 tests per year, including 18.2 tests per year in the period up to 1963 and 1.7 tests per year in the period 1964–1990 .

In the period up to 1963, 70% of all tests at the Novaya Zemlya test site were conducted.

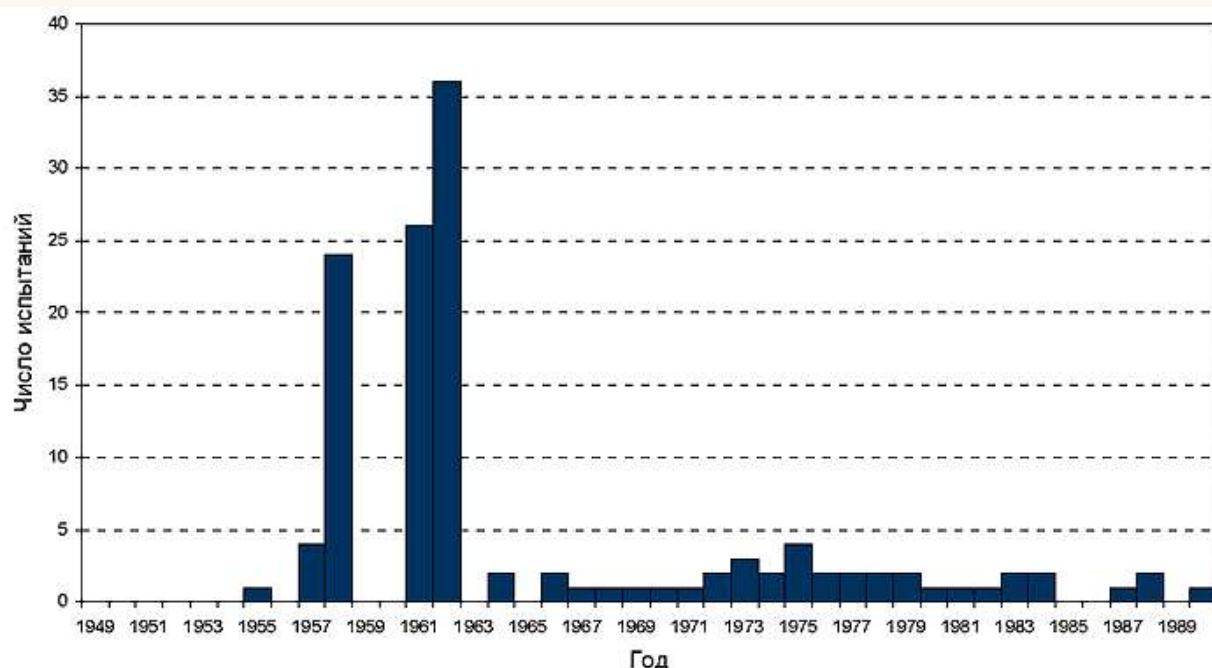


Fig. 3.4. Nuclear tests at the Northern Test Site "Novaya Zemlya"

Table 3.10 shows the distribution of the number of nuclear tests conducted at the SPNZ, according to the conditions under which they were conducted.

Table 3.10. Distribution of the number of nuclear tests at the Northern Test Site "Novaya Zemlya" by the conditions of their implementation

Terms and Conditions	Ground explosion	Air burst	Surface explosion	Underwater explosion	Underground explosions		Total
					Gallery	Well	
N_{and}	1	85	2	3	33	6	130

Table 3.11 shows the distribution of the number of nuclear tests conducted at the SPNZ by test purpose.

Tests for the purposes of nuclear weapons and IPF account for 91.5% of the total number of nuclear weapons conducted at the Novaya Zemlya test site.

Table 3.11. Distribution of the number of nuclear tests at the Northern Test Site "Novaya Zemlya" by test purposes

Target	XIAO	IAR	IPF	FMI	PV	OPZ	Total
1955–1990	115	-	5	9	-	1	130
1955–1962	82	-	3	6	-	-	91

4. From 1957 to 1962, 10 launch vehicles were launched from the Kapustin Yar nuclear testing site to conduct nuclear tests. These included all 5 high-altitude and space nuclear weapons.

The Kapustin Yar site is located in the Astrakhan region of the RSFSR. The purpose of these tests was to study the damaging effects of a nuclear explosion.

5. On September 14, 1954, in the area of the city of Totsk in the Orenburg region, an aerial nuclear explosion was carried out during military exercises.

6. On February 2, 1956, a ground nuclear explosion was conducted near the city of Aralsk, Kazakh SSR. The purpose of the test was to study the damaging effects of nuclear weapons.

7. Between 1966 and 1979, 17 nuclear tests were conducted at the Azgir site in the Guryev region of the Kazakh SSR in the interests of developing nuclear explosive technologies for industrial

purposes. All tests were conducted in boreholes. Some tests were repeated in cavities formed by previous nuclear explosions.

8. With the exception of the nuclear tests mentioned above, since 1965, 100 nuclear tests have been conducted outside the test sites and sites considered, which are classified as industrial explosions.

Table 3.12 shows the number of such explosions carried out in various regions of the USSR.

Table 3.12. Distribution of the number of industrial explosions conducted outside test sites and sites by region

Region	Number of tests
European part of the RSFSR	48
Asian part of the RSFSR	32
Kazakh SSR	15
Ukrainian SSR	2
Uzbek SSR	2
Turkmen SSR	1

80% of nuclear explosions of the category under consideration were carried out on the territory of the Russian Federation.

Table 3.13 shows the distribution of the number of industrial explosions of this category by the year they were carried out.

Table 3.13. Distribution of the number of industrial explosions conducted outside the territory of test sites and sites, by year

Year	1965	1966	1967	1968	1969	1970	1971	1972
<i>N</i> and	2	1	1	1	4	3	6	8
Year	1973	1974	1975	1976	1977	1978	1979	1980
<i>N</i> and	5	4	2	1	4	5	5	5
Year	1981	1982	1983	1984	1985	1987	1988	-
<i>N</i> and	5	8	9	11	2	6	2	-

97 nuclear explosions of the category under consideration were carried out in boreholes, 3 nuclear explosions - in adits.

Nuclear Test Characteristics by Power Release

1. In accordance with the accepted classification of energy release of nuclear tests of the USSR, six energy intervals are considered. Table 3.14 shows the distribution of the number of nuclear tests of the USSR by these intervals.

Table 3.14. Distribution of the number of nuclear tests of the USSR by energy release levels for the period 1949–1990.

ΔE	< 0.001	0.001–20	20–150	150–1500	1500–10000	≥ 10000	Total
<i>N</i> and	24	429	174	55	27	6	715

For the period 1949–1962.							
<i>N</i>_{and}	8	116	27	42	22	6	221
For the period 1964–1975.							
<i>N</i>_{and}	5	148	43	13	5	0	214
For the period 1976–1990.							
<i>N</i>_{and}	11	165	104	0	0	0	280

88% of all nuclear tests conducted by the USSR had an energy release not exceeding 150 kt. Moreover, in the period 1949–1962 the share of nuclear tests with $E < 150$ kt was 68%, and in the period 1964–1975 (before the entry into force of the treaty on limiting the yield of underground nuclear tests to a threshold of 150 kt) – 91.5% .

Moreover, 63% of all nuclear tests of the USSR had an energy release not exceeding 20 kt. In the period 1949–1962 the share of such nuclear tests was 56%, in the period 1964–1975 – 71.5% , in the period 1976–1990 – 63%.

2. Six nuclear tests of the USSR had an energy release of > 10 Mt , including the most powerful nuclear explosion with an energy release of 50 Mt , conducted on October 30, 1961 (this explosion was conducted at an altitude of $H = 4000$ meters from the earth's surface, i.e. at a reduced altitude of $H = 108.5 \text{ m/kt}^{1/3}$). All these tests were conducted in 1961–1962 at the SIPNZ under airburst conditions and in the interests of improving nuclear weapons.

3. 27 nuclear tests of the USSR had an energy release in the range of $E = 1.5\text{--}10$ Mt. Of these, 22 tests were conducted in 1955–1962 , and five in 1970–1971 and 1973–1974 . The first explosion of this class was conducted on November 22, 1955, at the Semipalatinsk test site in the air detonation mode. The energy release of this explosion was 1.6 Mt, the explosion height was 1,550 meters, and the equivalent height was $H = 132.5 \text{ m/kt}^{1/3}$. The remaining nuclear explosions of this category were conducted at the Novaya Zemlya test site, 21 of them in the air detonation mode, and five in mine workings (in three adits and two boreholes) . All nuclear explosions of this class were conducted in the interests of improving nuclear weapons.

4. 55 nuclear tests of the USSR had an energy release in the range of $E = 150\text{--}1500$ kt . The dynamics of such tests over time is given in **Table 3.15** . The first nuclear explosion of this category was conducted on August 12, 1953, at the Semipalatinsk test site. It was a ground explosion with a capacity of 400 kt. The maximum intensity of nuclear tests of this class occurred in 1962 (13 tests) , and in the period after 1963 – in 1975 (4 tests) .

Table 3.15. Distribution of the number of nuclear tests with energy release $E = 150\text{--}1500$ kt by the year they were conducted

Year	1953	1955	1956	1957	1958	1961	1962	1966
<i>N</i>_{and}	1	1	2	3	10	12	13	2
Year	1967	1968	1969	1972	1973	1974	1975	Σ
<i>N</i>_{and}	1	1	1	2	1	1	4	55

The distribution of the number of this class of nuclear tests by the conditions under which they were conducted is given in **Table 3.16** .

Table 3.16. Distribution of the number of nuclear tests with energy release $E = 150\text{--}1500$ kt by the conditions of their implementation

Terms and Conditions	Ground explosion	Air burst	High altitude explosion	Underground explosions		Total
				Gallery	Well	

<i>N</i> and	1	38	3	9	4	55
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The following tests were conducted for this category of purposes:

- 51 tests in the interests of nuclear weapons;
- 3 tests in the interests of the IPF;
- 1 test in the interests of the OPP.

At the location where this category of tests was carried out, the following were conducted:

- 43 tests on the SPNZ;
- 9 tests on SIP;
- 3 tests at the RIP "Kapustin Yar".

Table 3.17. Distribution of the number of nuclear tests with energy release $E = 20\text{--}150$ kt by the year they were conducted

Year	1949	1951	1953	1954	1956	1957	1958	1961	1962	1964	1965	1966
<i>N</i> and	1	2	1	2	4	4	5	3	5	4	1	7
Year	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
<i>N</i> and	2	3	4	5	6	2	3	2	4	6	6	14
Year	1979	1980	1981	1982	1983	1984	1985	1987	1988	1989	1990	Σ
<i>N</i> and	13	8	8	5	6	12	5	9	7	4	1	174

5. 174 nuclear tests of the USSR had energy release in the range $E = 20\text{--}150$ kt . The first nuclear explosion of this category was conducted on August 29, 1949 at the Semipalatinsk test site — this was the first Soviet nuclear test. The dynamics of tests of this category over time is given in **Table 3.17** . The maximum intensity of tests of this class occurred in 1978 (14 tests) .

The distribution of the number of this class of nuclear tests according to the conditions under which they were conducted is given in **Table 3.18** .

Table 3.18. Distribution of the number of nuclear tests with energy release $E = 20\text{--}150$ kt by the conditions of their implementation

Terms and Conditions	Ground explosion	Air burst	Underground explosions		Total
			Gallery	Well	
<i>N</i> and	4	23	44	103	174

The distribution of this category of nuclear tests by purpose is given in **Table 3.19** .

Table 3.19. Distribution of the number of nuclear tests with energy release $E = 20\text{--}150$ kt by the purposes for which they were conducted

Target	XIAO	IAR	IPF	FMI	Higher School of Economics	PV	OPZ	Total
<i>N</i> and	125	-	6	15	1	19	8	174

Distribution of nuclear tests with energy release $E = 20\text{--}150$ kt by location:

- 127 tests at the Semipalatinsk test site;
- 27 tests at the Novaya Zemlya test site;
- 8 tests at the Azgir site;
- 1 test in the area of the city of Totsk (military exercises in 1954) ;
- 1 test at the RIP "Kapustin Yar";

- 10 industrial tests outside the testing grounds.

6. 429 nuclear tests of the USSR had energy releases in the range from 1 t to 20 kt of TNT equivalent. The first nuclear explosion of this category was conducted on September 3, 1953 at the Semipalatinsk test site. It was an air explosion with a power of 5.8 kt at an altitude of 255 meters ;
the reduced altitude was $H = 142 \text{ m/kt}^{1/3}$. The dynamics of tests of this category over time is given in **Table 3.20**.

Table 3.20. Distribution of the number of nuclear tests with energy release $E = 1 \text{ t} - 20 \text{ kt}$ by the years of their implementation

Year	1953	1954	1955	1956	1957	1958	1961	1962	1964	1965	1966	1967
<i>N</i>_{and}	3	7	4	3	7	14	36	42	5	13	9	14
Year	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
<i>N</i>_{and}	12	14	9	16	19	10	16	11	15	18	15	15
Year	1980	1981	1982	1983	1984	1985	1987	1988	1989	Σ	-	-
<i>N</i>_{and}	15	10	14	18	15	5	14	8	3	429	-	-

The maximum intensity of testing of this class occurred in 1962 (42 tests) , and in the period after 1963 - in 1972 (19 tests) .

The distribution of the number of nuclear tests of this class according to the conditions under which they were conducted is given in **Table 3.21** .

Table 3.21. Distribution of the number of nuclear tests with energy release $E = 1 \text{ t} - 20 \text{ kt}$ by the conditions of their implementation

Terms and Conditions	Ground explosion	Air burst	Space explosion	Underwater and above-water explosions	Underground explosions		Total
					Gallery	Well	
<i>N</i>_{and}	20	87	2	5	174	141	429

Table 3.22 shows the distribution of the number of nuclear tests in this category by test purpose.

Table 3.22. Distribution of the number of nuclear tests with energy release $E = 1 \text{ t} - 20 \text{ kt}$ by test purposes

Target	XIAO	IAR	IPF	FMI	PV	OPZ	Total
<i>N</i>_{and}	231	6	43	21	105	23	429

The number of nuclear tests of class 1 t - 20 kt is distributed by area as follows:

- 297 tests at the Semipalatinsk test site;
- 26 tests at the Novaya Zemlya test site;
- 9 tests at the Azgir site;
- 1 test in the Aralsk area;
- 6 tests at the RIP "Kapustin Yar";
- 90 industrial tests outside the testing grounds.

7. 24 nuclear tests belong to the category of nuclear tests with a near-zero nuclear yield. We emphasize once again that the considered sample does not cover all works with fissile materials corresponding to this level of energy release (hydronuclear and hydrodynamic experiments are not included in this set) . The first test of this class was conducted on October 19, 1954, at the Semipalatinsk test site. This was a ground test with a failure of the nuclear charge. The dynamics of these nuclear explosions over time are given in **Table 3.23** .

Table 3.23. Distribution of the number of nuclear tests with energy release $E < 0.001 \text{ kt}$ by the year of their implementation

Year	1954	1958	1961	1962	1968	1970	1972	1973
<i>N</i> and	1	1	2	4	1	1	1	1
Year	1974	1978	1979	1980	1981	1983	1988	Total
<i>N</i> and	1	2	3	1	3	1	1	24

Table 3.24 shows the distribution of the number of tests of this class according to the conditions under which they are carried out.

Table 3.24. Distribution of the number of nuclear tests with energy release $E < 0.001$ kt by the conditions of their implementation

Terms and Conditions	Ground explosion	Air burst	Underground explosions		Total
			Gallery	Well	
<i>N</i> and	7	1	15	1	24

19 nuclear tests of this class fall under the category of IAR, 5 nuclear tests fall under the category of SNF.

23 nuclear tests of this class were conducted at the Semipalatinsk test site, and one test was conducted at the Novaya Zemlya test site.

Total energy release from USSR nuclear tests

Table 3.25 shows the distribution of the total energy release of nuclear tests of the USSR by year and main regions. In this case, the column "Azgir and PV outside the test sites" shows the totality of nuclear tests for peaceful purposes conducted outside the test sites, including the Azgir site.

Energy release values are given in rounded units (kt) with an accuracy of 10 kt.

Table 3.25. Distribution of total energy release from USSR nuclear tests by year and region of their implementation

Year	Nuclear Test Power				Total
	SIP	SPNZ	Azgir and PV outside the training grounds	"Kapustin Yar", Totsk, Aralsk	
1949	20	-	-	-	20
1950	-	-	-	-	-
1951	80	-	-	-	80
1952	-	-	-	-	-
1953	440	-	-	-	440
1954	80	-	-	40	120
1955	1870	<10	-	-	1880
1956	1970	-	-	<10	1980
1957	1680	4540	-	10	6230
1958	80	16130	-	20	16230
1959	-	-	-	-	0
1960	-	-	-	-	0

1961	140	86240	-	50	86430
1962	220	132710	-	900	133830
1963	-	-	-	-	0
1964	90	20	-	-	110
1965	250	0	10	-	260
1966	420	1400	30	-	1850
1967	220	260	<10	-	490
1968	120	330	60	-	510
1969	270	540	60	-	870
1970	150	2200	160	-	2510
1971	300	2450	130	-	2880
1972	450	1130	40	-	1620
1973	310	7820	40	-	8170
1974	150	3430	30	-	3610
1975	210	4190	20	-	4420
1976	300	140	80	-	520
1977	350	130	50	-	530
1978	620	240	270	-	1130
1979	960	280	170	-	1410
1980	600	130	40	-	770
1981	610	140	70	-	820
1982	470	80	90	-	640
1983	440	250	90	-	780
1984	1130	110	80	-	1320
1985	450	0	10	-	460
1986	0	0	0	-	0
1987	1000	150	40	-	1190
1988	670	220	20	-	910
1989	300	0	0	-	300
1990	0	70	0	-	70

Table 3.26 presents the values of the total energy release of nuclear tests in the USSR, including for the specified test sites and groups of sites for the periods 1949–1962 , 1964–1975, and 1976–1990 .

Table 3.26. Total energy release of USSR nuclear tests by time intervals

Years	Nuclear Test Power				Total
	SIP	SPNZ	Azgir and industrial explosions	"Kapustin Yar", Totsk, Aralsk	
1949–1962	6580	239630	0	1030	247240
1964–1975	2940	23770	590	0	27300

1976–1990	7900	1940	1010	0	10850
Total	17420	265340	1600	1030	285390

From the given data it follows:

1. The total energy release of Soviet nuclear tests is estimated at $E = 285$ Mt, of which 87% of the energy release was realized in experiments before 1963. At the same time, the six most powerful nuclear explosions of the USSR with $E > 10$ Mt account for an energy release of $E = 147$ Mt (51.5% of the total yield of nuclear weapons). After deducting this energy release, the total yield of the remaining 709 nuclear weapons is $E = 138$ Mt or an average of about 195 kt per test.

2. The distribution of values of average nuclear test yields is characterized by the data given in **Table 3.27**.

Moreover, for the SIPNZ test site in the period 1949–1962, two average power values are given (without and with the contribution of six super-powerful nuclear explosions).

Table 3.27. Values of average nuclear test yields (kt)

Years	SIP	SPNZ	Azgir and industrial explosions	"Kapustin Yar", Totsk, Aralsk
1949–1962	55.8	1090 (2633)	-	85
1964–1975	19.2	1189	14.9	-
1976–1990	42.7	102	13	-
1949–1990	38.2	953 (2041)	13.7	85

3. The distribution of the share of energy release of nuclear radiation by the location of the event is characterized by the data given in **Table 3.28**.

Table 3.28. Shares of energy release of nuclear radiation at test sites and sites (%)

Years	SIP	SPNZ	Azgir and industrial explosions	"Kapustin Yar", Totsk, Aralsk
1949–1962	2.65	96.95	-	0.4
1964–1975	10.75	87.15	2.1	-
1976–1990	72.8	17.9	9.3	-
1949–1990	6.1	93	0.55	0.35

4. For the period 1964–1990, the total energy release from nuclear tests in the USSR was approximately 38 Mt, of which 10.8 Mt came from the Semipalatinsk test site, 25.7 Mt from the test site on Novaya Zemlya, 1.6 Mt from the Azgir site and industrial explosions outside the test site.

5. The maximum energy release of nuclear tests in the USSR occurred in 1962 - 134 Mt (47% of the total energy release of nuclear tests in the USSR), taking into account the energy release of super-powerful explosions.

For the period 1964–1975, the maximum energy release from nuclear tests occurred in 1973 (8.2 Mt), and for the period 1976–1990, in 1979 (1.4 Mt).

6. The maximum energy release from nuclear tests at the Semipalatinsk test site occurred in 1956 (2 Mt). For the period 1964–1975, the maximum energy release from nuclear tests at the Semipalatinsk test site occurred in 1972 (0.45 Mt), and for the period 1976–1990, in 1984 (1.1 Mt).

7. The maximum energy release from nuclear tests at the Northern Test Site "Novaya Zemlya" occurred in 1962 – 132 Mt.

During the period 1964–1975, the maximum energy release from nuclear tests at the SPNZ occurred in 1973 (7.3 Mt) , and during the period 1976–1990, in 1979 (0.28 Mt) .

8. The maximum energy release from nuclear tests conducted at the Azgir site and industrial explosions outside the test sites occurred in 1978 and amounted to 0.27 Mt.

9. The total yield of all 124 nuclear explosions for peaceful purposes is 1.76 Mt, which is 4.6% of the total yield of nuclear tests of the USSR in the period after 1963, i.e. during the period of underground nuclear tests. At the same time, the share of nuclear explosions for peaceful purposes was 25% of the total number of nuclear tests in this period.

Above-ground nuclear tests (1949–1962)

Ground-based nuclear tests stand out among other types of atmospheric tests due to their decisive long-term radiation and environmental impact on the test site territory.

Tests that were carried out directly on the ground surface or on special devices (trailers , carts, stands, towers) are given in **Table 3.29** .

Table 3.29. USSR ground nuclear tests

Date	Venue and conditions of the event	Power, kt
Semipalatinsk test site		
29.08.49	Tower, 30 m	22
24.09.51	Tower, 30 m	38
12.08.53	Tower, 30 m	400
15.10.54	On the surface 0 m	4
10/19/54	Tower, 15 m	0
10/30/54	Dropped from an airplane with detonation at an altitude of 55 m	10
29.07.55	On the surface 2.5 m	1.3
02.08.55	2.5 m	12
05.08.55	1.5 m	1,2
16.03.56	0.4 m	14
25.03.56	On the surface 1 m	5.5
24.08.56	Tower, 100 m	27
09.09.61	On the surface 0 m	0.38
09.14.61	0 m	0.4
09/18/61	1 m	0.004
19.09.61	0 m	0.03
03.11.61	0 m	0
04.11.61	0 m	0.15
07.08.62	0 m	9.9
22.09.62	0 m	0.21
25.09.62	0 m	7

10/30/62	0 m	1,2
05.11.62	Tower, 15 m	0.4
11.11.62	8 m	0,1
11/13/62	On the surface 0 m	0
24.11.62	0 m	<0.001
26.11.62	0 m	0.031
23.12.62	0 m	0
24.12.62	0 m	0,007
24.12.62	0 m	0.028
The "New Earth" testing ground		
07.09.57	0 m	32
Aralsk region		
02.02.56	Rocket launch 0 m	0.4

Thus, 32 ground explosions can be noted (30 - SIP , 1 - SIPNZ , 1 - Aralsk) , of which in five cases there was practically no release of nuclear energy: 10/19/54, 11/03/61, 11/13/62, 11/24/62, 12/23/62.

The total energy release of ground-based nuclear explosions is $E = 587$ kt , including at the Semipalatinsk test site $E = 555$ kt , with 72% of this energy release coming from the nuclear test on August 12, 1953.

Group nuclear tests and group nuclear explosions for peaceful purposes

In connection with the transition to underground nuclear testing after 1963, the USSR developed a technology for conducting nuclear tests in which several nuclear explosive devices were detonated simultaneously. Such nuclear tests are hereinafter conventionally referred to as group nuclear tests and group nuclear explosions for peaceful purposes.

In total, in the period 1964–1990 in the USSR, out of a total of 494 nuclear tests, more than one nuclear device was detonated in 146 tests. The total number of nuclear explosive devices in these tests was 400 units, i.e., on average, approximately 2.7 devices per test.

The total number of nuclear devices detonated in Soviet nuclear tests between 1949 and 1990 was 969 units in 715 nuclear tests, including 748 units in 494 nuclear tests after 1963.

The distribution of the number of group nuclear tests (including peaceful ones) by the time they were conducted is given in **Table 3.30** .

Table 3.30. Distribution of the number of group nuclear tests and detonated nuclear charges in them by year

Year	1965	1966	1967	1968	1969	1970	1971
N_{gi}	1	1	6	4	4	3	3
N_{gz}	2	2	12	10	9	8	9
Year	1972	1973	1974	1975	1976	1977	1978
N_{gi}	4	2	2	6	4	7	10
N_{gz}	11	7	8	22	10	19	34

Year	1979	1980	1981	1982	1983	1984	1985
N_{gi}	15	10	9	11	7	11	5
N_{gz}	36	29	25	26	19	27	14
Year	1987	1988	1989	1990	Σ	-	-
N_{gi}	10	7	3	1	146	-	-
N_{gz}	26	20	7	8	400	-	-

Note: N_{gi} is the number of group nuclear tests; N_{gz} is the number of nuclear charges detonated in group nuclear tests.

Group nuclear tests were conducted both in individual workings (adits , boreholes) and with "simultaneous" detonation in more than one working (adit , borehole) . Group nuclear tests were conducted for both weapons and peaceful purposes.

The first group nuclear test falls into the category of industrial explosions and was conducted on March 30, 1965 as part of Operation Butane at the Grachevskoye oil field (Bashkiria , RSFSR) . It consisted of a simultaneous explosion in two wells, each of which contained one nuclear device.

The first group nuclear test in one mine working (adit 14) was conducted on December 3, 1966 at the Semipalatinsk test site, and consisted of the simultaneous detonation of two nuclear devices.

On October 21, 1967, a group nuclear test was conducted at the SIPNZ with simultaneous detonation in two adits (A-4, A-5) , each of which housed one nuclear device.

On October 18, 1975, the first group nuclear test was conducted at the SIPNZ with the simultaneous detonation of two nuclear explosive devices in one well (Yu-6N).

The last group nuclear test on October 24, 1990 was the last nuclear test of the USSR (SIPNZ) .

The maximum number of group nuclear tests by the USSR occurred in 1979 (15 group tests out of a total of 31 tests that year) . In the same year, the maximum number of nuclear devices were detonated as part of group tests (36 nuclear devices) .

The maximum number of nuclear explosions in one nuclear test of the USSR is 8, first carried out on August 23, 1975 in the A-10 adit (SIPNZ) .

Table 3.31 shows the distribution of group nuclear tests of the USSR by the regions where they were conducted.

Table 3.31. Distribution of group nuclear explosions by areas where they were carried out

District	SIP	SPNZ	Azgir	Rest	Total
N_{gi}	111	28	4	3	146
N_{gz}	262	122	9	7	400

For the SIP, the typical value is 2.4 nuclear devices per one group nuclear explosion, while for the SIPNZ, this value is 4.3 nuclear devices per one group nuclear explosion.

Table 3.32 shows the distribution of the number of nuclear tests and nuclear charges detonated in them at the SIP, SIPNZ test sites, the Azgir site and in other regions, taking into account group nuclear weapons for the periods 1949–1990 and 1964–1990 .

Table 3.32. Distribution of the total number of nuclear tests and nuclear charges detonated in them by area of testing

Period	Quantity	SIP	SPNZ	Azgir	Rest	Total
1949–1990	N_{and}	456	130	17	112	715

	N_z	607	224	22	116	969
1964–1990	N_{and}	338	39	17	100	494
	N_z	489	133	22	104	748

Group nuclear explosions were carried out in horizontal workings (adits) and in vertical workings (boreholes) .

Of the 400 nuclear devices detonated in group explosions, 257 explosive devices were tested in adits (85 tests) and 143 in boreholes (61 tests) . **Table 3.33** shows the distribution of the number of underground nuclear tests in the USSR and the nuclear explosions in them by the method of implementation.

Table 3.33. Distribution of the number of underground nuclear tests and nuclear explosions in them by the method of implementation

Method of implementation	Gallery	Well	Total
N_{and}	245	251	496
N_z	414	336	750

Table 3.34 shows the distribution of the number of group nuclear tests and nuclear explosions in them by test purposes.

Table 3.34. Distribution of the number of group nuclear tests and nuclear explosions in them by test purposes

Target	XIAO	IPF	FMI	IAR	OPZ	PV	Total
N_{gi}	120	8	4	0	6	8	146
N_{gz}	312	25	15	17	12	19	400

Table 3.35 and Figs. 3.5 and 3.6 show the distribution of the number of nuclear tests in the USSR and nuclear explosions in them by test and explosion targets in the periods 1949–1990 and 1964–1990 .

Table 3.35. Distribution of the number of nuclear tests and nuclear explosions in them by test purposes

Period	Quantity	XIAO	IPF	FMI	IAR	OPZ	PV	Higher School of Economics	Total
1949–1990	N_{and}	445	52	36	25	32	124	1	715
	N_z	637	69	47	42	38	135	1	969
1964–1990	N_{and}	264	35	25	14	32	124	0	494
	N_z	456	52	36	31	38	135	0	748

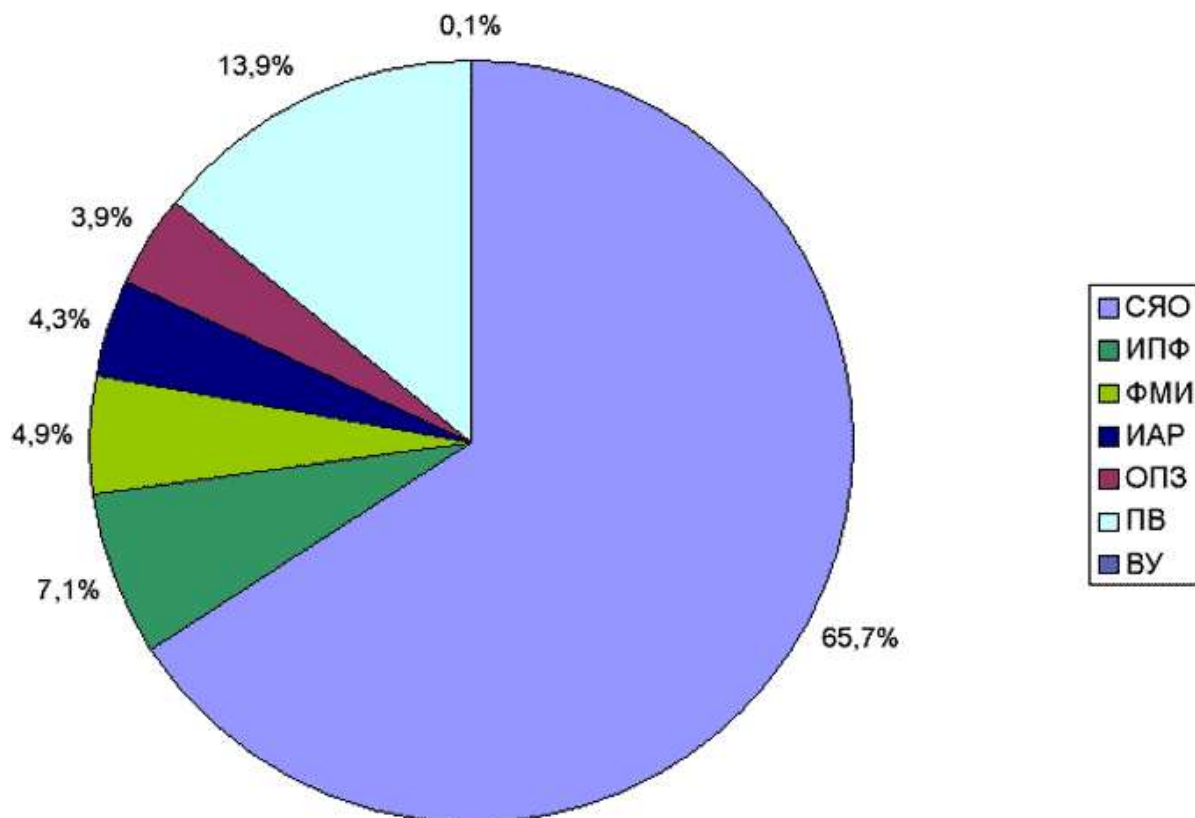


Fig. 3.5. Distribution of nuclear charge tests by targets in the period 1949–1990.

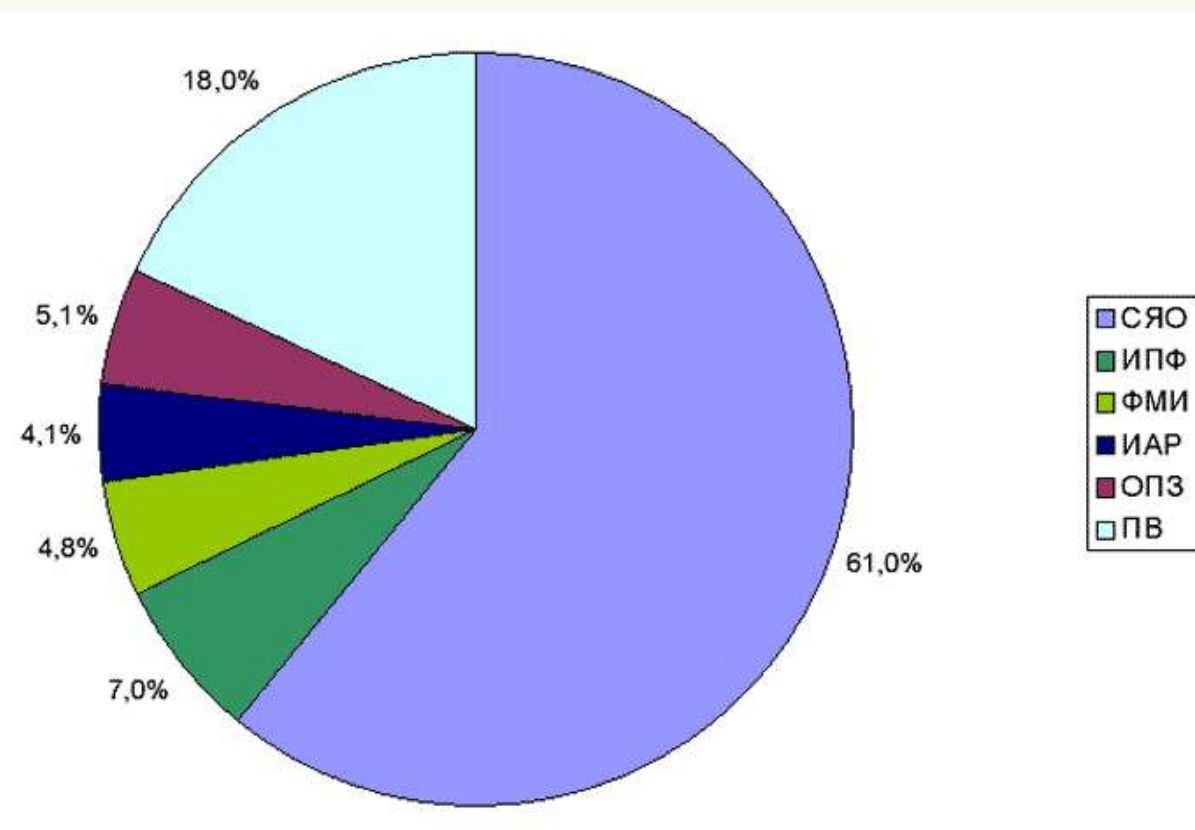


Fig. 3.6. Distribution of nuclear charge tests by targets in the period 1964–1990.

Table 3.36 shows the distribution of the number of group nuclear tests and nuclear explosions in them by energy release ranges.

Table 3.36. Distribution of the number of group nuclear tests and nuclear explosions in them by energy release ranges

ΔE	< 0.001	0.001–20	20–150	150–1500	1500–10000	Total

N_{gi}	0	61	74	8	3	146
N_{gz}	16	271	81	31	1	400

Table 3.37 and Figs. 3.7 and 3.8 show the distribution of the number of nuclear tests of the USSR and nuclear explosions in them by energy release ranges for the periods 1949–1990 and 1964–1990

Table 3.37. Distribution of the number of nuclear tests and nuclear explosions in them by energy release ranges

Period	Quantity	< 0.001	0.001–20	20–150	150–1500	1500–10000	> 10000	Total
1949–1990	N_{and}	24	429	174	55	27	6	715
	N_z	40	638	182	78	25	6	969
1964–1990	N_{and}	16	313	147	13	5	0	494
	N_z	32	523	154	36	3	0	748

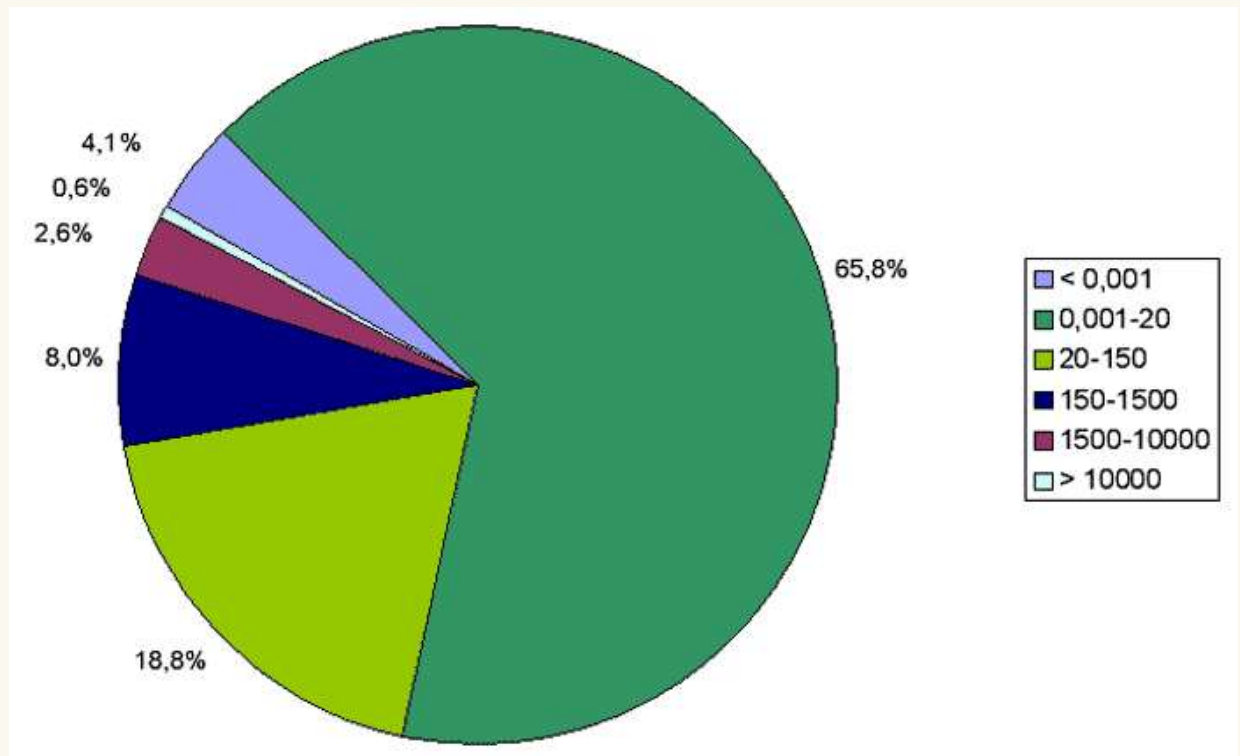


Fig. 3.7. Distribution of nuclear charge tests by energy release ranges (kt) in the period 1949–1990.

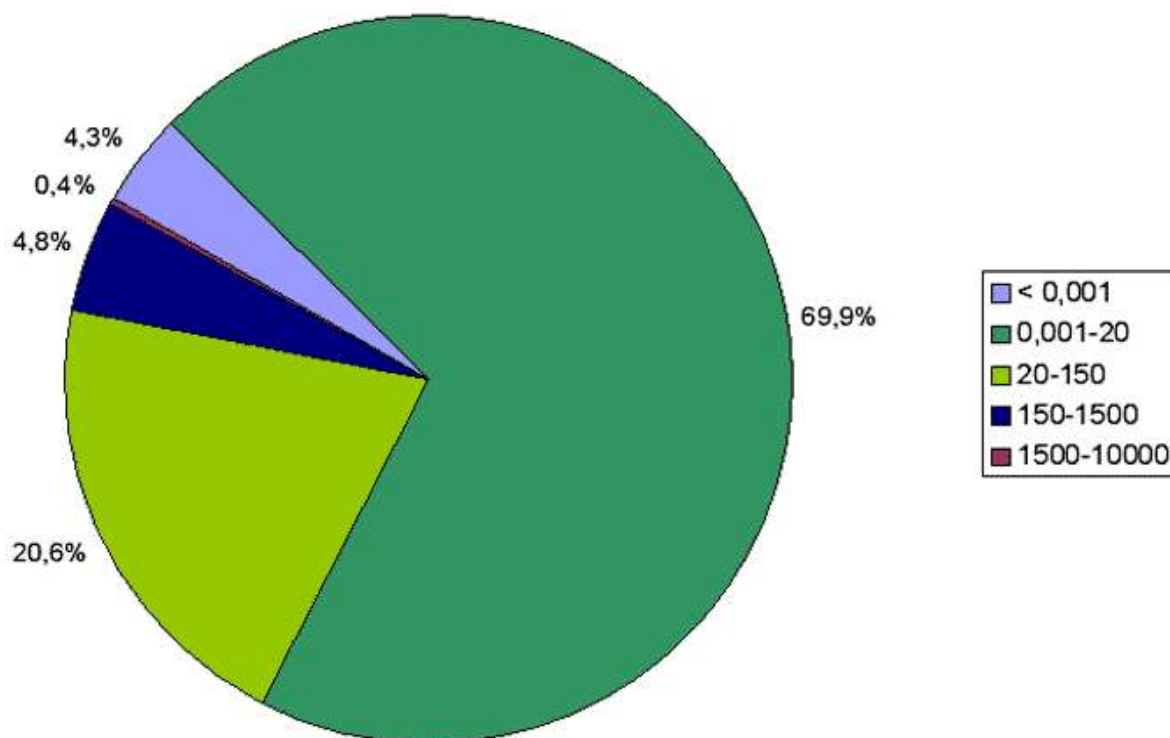


Fig. 3.8. Distribution of nuclear charge tests by energy release ranges (kt) in the period 1964–1990.

Comparison of general characteristics of nuclear testing programs of the USSR and the USA

General characteristics of nuclear testing programs implemented by the USSR and the USA are given in **Table 3.38**. Characteristics of US nuclear tests were taken from the book “United States Nuclear Tests. July 1945 through September 1992” DOE/NV-209 (Rev. 14) December 1994.

Table 3.38. General characteristics of the nuclear testing programs of the USSR and the USA

Characteristic	USSR	USA
Total number of nuclear tests	715	1056*
Total number of group nuclear tests	146	63
Total number of nuclear charges and devices detonated in tests and peaceful explosions	969	1151
Total number of nuclear tests for military purposes	559	1029
Total number of nuclear charges detonated for military purposes	796	1116
Total number of explosions for peaceful purposes	124	27
Total number of nuclear devices detonated for peaceful purposes	135	35

* Including two nuclear explosions in 1945 in Japan and 24 nuclear tests conducted at the Nevada Test Site jointly with Great Britain.

Table 3.39 shows the distribution of characteristics of nuclear tests by the USSR and the USA in the period before and after the entry into force of the 1963 Treaty Banning Nuclear Tests in Three Environments, and also separately for the period 1985–1992 (on September 23, 1992, the USA conducted its last nuclear test).

All 715 Soviet nuclear tests and explosions were conducted on Soviet soil, including 130 nuclear tests at the Novaya Zemlya Northern Test Site. Of the 1,056 US nuclear tests, 945 were conducted within the continental United States (including three tests at Amchitka Island).

Table 3.39. Distribution of the number of nuclear tests and nuclear explosions in them by time ranges

Period	USSR		USA	
	N_{and}	N_z	N_{and}	N_z
1949–1963	221	221	333	333
1963–1992	494	748	723	818
1985–1992	57	75	92	113

Table 3.40 and Figs. 3.9 and 3.10 show the characteristics of the distribution of nuclear tests and explosions of the USSR and the USA by the methods of their implementation.

Table 3.40. Distribution of the number of nuclear tests and nuclear explosions in them by the methods of implementation

Country	Number of tests and charges	In the atmosphere, space and underwater					Underground	
		Air	Ground	High-altitude and space	Surface and underwater	Total	Total	Including for disposal
USSR	N_{and}	177	32	5	5	219	496	5
	N_z	177	32	5	5	219	750	9
USA*	N_{and}	83	84	9	41	217	839	9
	N_z	83	84	9	41	217	934	13

* For the United States, the category of ground explosions includes surface and tower tests .

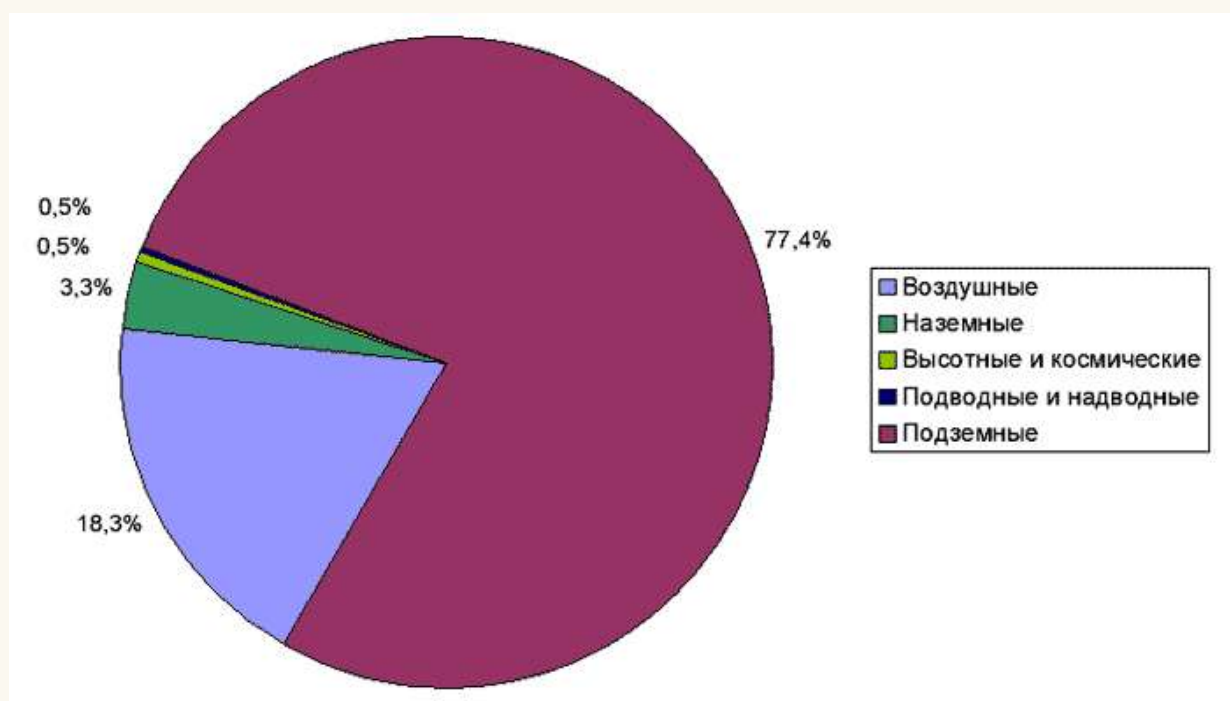


Fig. 3.9. Distribution of USSR nuclear tests by methods of their implementation

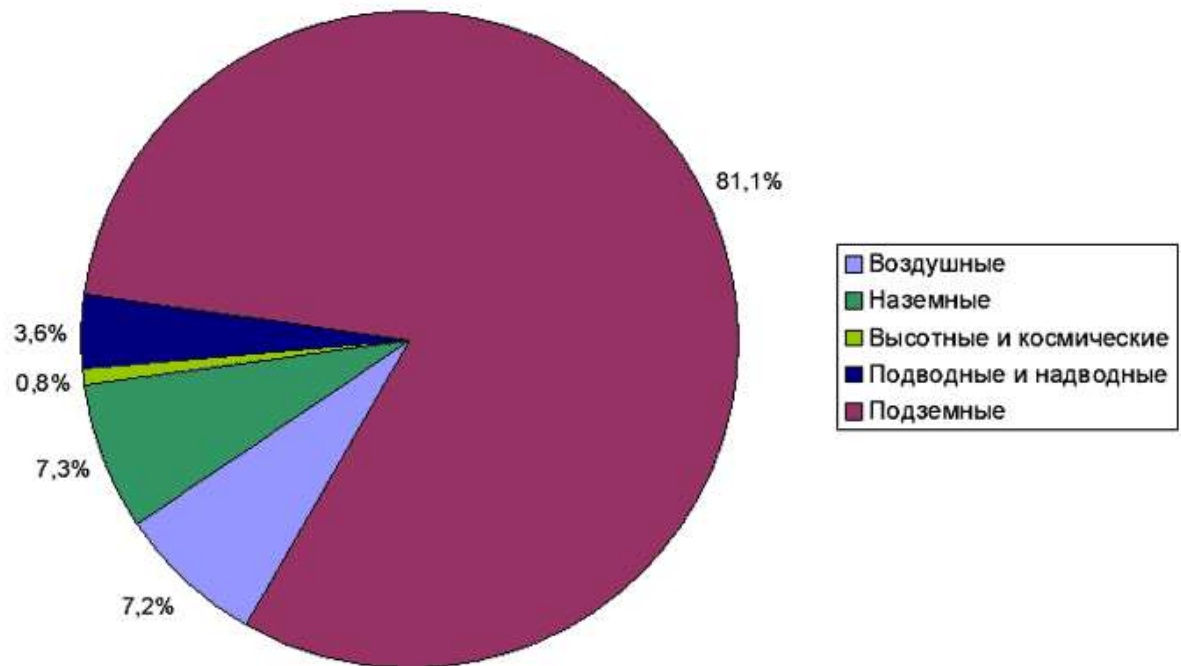


Fig. 3.10. Distribution of US nuclear tests by methods of their implementation

The total energy release of nuclear tests and explosions of the USSR is 285.38 Mt, including 38.14 Mt in the period after August 1963. We do not have official data on the characteristics of the total energy release of nuclear tests and explosions of the USA. Note that according to the work of R. Norris, T. Cochran. "Nuclear Weapons Databook", 1994, the total energy release of nuclear tests of the USA is estimated at 180 Mt, including 38 Mt in the period after August 1963.

Appendix 1

Nuclear tests and nuclear explosions of the USSR (1949–1990)

Notes: The geographic names of the regions where nuclear tests and explosions were conducted correspond to the names that existed during the USSR.

According to the calendar, the dates of the tests correspond to Moscow time.

The last column of the table (Notes) mainly notes the specifics of how individual nuclear tests were conducted.

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
The 1949 program						
1	29.08.49	SIP	Ground	XIAO	22	RDS-1 . First nuclear test of the USSR; first test on the SIP; first ground test
Program of 1951						
2	24.09.51	SIP	Ground	XIAO	38	RDS-2
3	18.10.51	SIP	Air	XIAO	42	RDS-3 First air test of the USSR; dropping of an aerial bomb
Program of 1953						
4	12.08.53	SIP	Ground	XIAO	400	RDS-6 s .The first thermonuclear

						explosion of the USSR; the most powerful land-based nuclear explosion
5	23.08.53	SIP	Air	XIAO	28	RDS-4
6	03.09.53	SIP	Air	XIAO	5.8	
7	08.09.53	SIP	Air	XIAO	1.6	
8	10.09.53	SIP	Air	XIAO	4.9	
Program of 1954						
9	09.14.54	Totsk area, USSR Ministry of Defense training ground, Orenburg region, RSFSR	Air	Higher School of Economics	40	Military exercises in airborne nuclear warfare conditions
10	29.09.54	SIP	Air	XIAO	0.2	
11	01.10.54	SIP	Air	XIAO	0.03	
12	03.10.54	SIP	Air	XIAO	2	
13	05.10.54	SIP	Ground	XIAO	4	
14	08.10.54	SIP	Air	XIAO	0.8	
15	10/19/54	SIP	Ground	XIAO	< 0.001	Torpedo charge test. First nuclear charge failure
16	23.10.54	SIP	Air	XIAO	62	RDS-3 First test of a charge with external neutron initiation and new automatic detonation.
17	26.10.54	SIP	Air	XIAO	2.8	RDS-5 Repeated test of a charge with external neutron initiation and new automatic detonation.
18	10/30/54	SIP	Ground	XIAO	10	
1955 program						
19	29.07.55	SIP	Ground	XIAO	1.3	Tests 19 , 20 , 21 - various types of torpedo charges.
20	02.08.55	SIP	Ground	XIAO	12	
21	05.08.55	SIP	Ground	XIAO	1,2	
22	21.09.55	SPNZ	Underwater	IPF	3.5	First test at the SPNZ in the Black Bay. Explosion of a

						533 mm torpedo at a depth of 12 m
23	06.11.55	SIP	Air	XIAO	250	
24	22.11.55	SIP	Air	XIAO	1600	RDS-37 . The first test of the USSR thermonuclear charge prototype; the most powerful explosion at the SIP
1956 program						
25	02.02.56	Aralsk district, Kazakh SSR	Ground	IPF	0.3	First land-based nuclear weapon in a missile launch with RIP
26	16.03.56	SIP	Ground	XIAO	14	
27	25.03.56	SIP	Ground	XIAO	5.5	
28	24.08.56	SIP	Ground	XIAO	27	
29	30.08.56	SIP	Air	XIAO	900	
30	02.09.56	SIP	Air	XIAO	51	
31	10.09.56	SIP	Air	XIAO	38	
32	11/17/56	SIP	Air	XIAO	900	
33	14.12.56	SIP	Air	XIAO	40	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
The 1957 program						
34	19.01.57	RIP	Air	IPF	10	First air-launched nuclear weapon in a missile launch with RIP
35	08.03.57	SIP	Air	XIAO	19	
36	03.04.57	SIP	Air	XIAO	42	
37	06.04.57	SIP	Air	XIAO	57	
38	10.04.57	SIP	Air	XIAO	680	
39	12.04.57	SIP	Air	XIAO	22	
40	16.04.57	SIP	Air	XIAO	320	
41	22.08.57	SIP	Air	XIAO	520	
42	26.08.57	SIP	Air	IAR	0,1	First test in the interests of nuclear weapons safety
43	07.09.57	SPNZ	Ground	FMI	32	The only land-based nuclear test site at the SPNZ. The area of the Black Bay, 100 m from the shore.

44	13.09.57	SIP	Air	XIAO	5.9	
45	24.09.57	SPNZ	Air	XIAO	1600	First aerial test at SIPNZ; dropping of aerial bomb
46	09.26.57	SIP	Air	XIAO	13	
47	06.10.57	SPNZ	Air	XIAO	2900	
48	10.10.57	SPNZ	Underwater	IPF	10	State tests of the T-5 torpedo in the Black Bay. Torpedo fired from a submarine. Explosion depth: 35 meters.
49	28.12.57	SIP	Air	XIAO	12	
1958 program						
50	04.01.58	SIP	Air	XIAO	1.3	
51	17.01.58	SIP	Air	XIAO	0.5	
52	23.02.58	SPNZ	Air	XIAO	860	
53	27.02.58	SPNZ	Air	XIAO	250	
54	27.02.58	SPNZ	Air	XIAO	1500	
55	13.03.58	SIP	Air	XIAO	1,2	
56	14.03.58	SIP	Air	XIAO	35	
57	14.03.58	SPNZ	Air	FMI	40	
58	15.03.58	SIP	Air	XIAO	14	
59	18.03.58	SIP	Air	FMI	0.16	
60	20.03.58	SIP	Air	XIAO	12	
61	21.03.58	SPNZ	Air	XIAO	650	
62	22.03.58	SIP	Air	XIAO	18	
63	30.09.58	SPNZ	Air	XIAO	1200	
64	30.09.58	SPNZ	Air	XIAO	900	
65	02.10.58	SPNZ	Air	XIAO	290	
66	02.10.58	SPNZ	Air	FMI	40	
67	04.10.58	SPNZ	Air	XIAO	9	
68	05.10.58	SPNZ	Air	XIAO	15	
69	06.10.58	SPNZ	Air	XIAO	5.5	
70	10.10.58	SPNZ	Air	XIAO	68	
71	12.10.58	SPNZ	Air	XIAO	1450	
72	10/15/58	SPNZ	Air	XIAO	1500	
73	18.10.58	SPNZ	Air	XIAO	2900	
74	10/19/58	SPNZ	Air	FMI	40	

75	10/19/58	SPNZ	Air	XIAO	< 0.001	
76	20.10.58	SPNZ	Air	XIAO	440	
77	21.10.58	SPNZ	Air	XIAO	2	
78	22.10.58	SPNZ	Air	XIAO	2800	
79	24.10.58	SPNZ	Air	XIAO	1000	
80	25.10.58	SPNZ	Air	XIAO	190	
81	25.10.58	SPNZ	Air	FMI	< 0.1	
82	01.11.58	RIP	Air	IPF	10	
83	03.11.58	RIP	Air	IPF	10	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1961 program						
84	01.09.61	SIP	Air	XIAO	16	
85	04.09.61	SIP	Air	XIAO	9	
86	05.09.61	SIP	Air	XIAO	16	
87	06.09.61	SIP	Air	XIAO	1,1	
88	06.09.61	RIP	Air	IPF	11	
89	09.09.61	SIP	Ground	IAR	0.38	
90	10.09.61	SPNZ	Air	XIAO	2700	
91	10.09.61	SPNZ	Air	XIAO	12	
92	10.09.61	SIP	Air	XIAO	0.88	
93	11.09.61	SIP	Air	XIAO	0.30	
94	12.09.61	SPNZ	Air	XIAO	1150	
95	13.09.61	SPNZ	Air	XIAO	6	
96	13.09.61	SIP	Air	XIAO	0.001 - 20	
97	09.14.61	SIP	Ground	XIAO	0.4	
98	09.14.61	SPNZ	Air	XIAO	1200	
99	09/16/61	SPNZ	Air	XIAO	830	
100	17.09.61	SIP	Air	XIAO	20 - 150	
101	09/18/61	SPNZ	Air	XIAO	1000	
102	09/18/61	SIP	Ground	IAR	0.004	
103	09/18/61	SIP	Air	XIAO	0.75	
104	19.09.61	SIP	Ground	IAR	0.03	
105	20.09.61	SIP	Air	XIAO	4.8	

106	20.09.61	SPNZ	Air	XIAO	150 - 1500	
107	21.09.61	SIP	Air	XIAO	0.80	
108	22.09.61	SPNZ	Air	XIAO	260	
109	26.09.61	SIP	Air	XIAO	1,2	
110	01.10.61	SIP	Air	XIAO	3	
111	02.10.61	SPNZ	Air	XIAO	250	
112	04.10.61	SIP	Air	XIAO	13	
113	04.10.61	SPNZ	Air	XIAO	1500 - 10000	
114	06.10.61	SPNZ	Air	XIAO	4000	
115	06.10.61	RIP	Air	IPF	40	
116	08.10.61	SPNZ	Air	XIAO	15	
117	11.10.61	SIP	Underground Adit B-1	FMI	1	First underground test of the USSR; first underground test on the SIP and first underground test in the adit
118	10/12/61	SIP	Air	XIAO	15	
119	10/17/61	SIP	Air	XIAO	6.6	
120	10/19/61	SIP	Air	XIAO	0.001 - 20	
121	20.10.61	SPNZ	Air	XIAO	1450	
122	23.10.61	SPNZ	Underwater	IPF	4.8	
123	23.10.61	SPNZ	Air	XIAO	12500	
124	25.10.61	SPNZ	Air	XIAO	300	
125	25.10.61	SIP	Air	FMI	0.50	
126	27.10.61	SPNZ	Surface	IPF	16	
127	27.10.61	RIP	Space	IPF	1,2	The first Soviet space explosion
128	27.10.61	RIP	Space	IPF	1,2	
129	10/30/61	SIP	Air	XIAO	0.09	
130	10/30/61	SPNZ	Air	XIAO	50000	A602EN The most powerful nuclear test of the USSR. The most powerful nuclear weapon in world history.
131	10/31/61	SPNZ	Air	XIAO	5000	
132	10/31/61	SPNZ	Air	XIAO	150 - 1500	

133	01.11.61	SIP	Air	XIAO	2.7	
134	02.11.61	SPNZ	Air	XIAO	120	
135	02.11.61	SPNZ	Air	XIAO	280	
136	02.11.61	SIP	Air	XIAO	0.6	
137	03.11.61	SIP	Ground	IAR	< 0.001	
138	03.11.61	SIP	Air	XIAO	0.9	
139	04.11.61	SPNZ	Air	XIAO	15	
140	04.11.61	SPNZ	Air	XIAO	150 - 1500	
141	04.11.61	SPNZ	Air	XIAO	6	
142	04.11.61	SIP	Ground	XIAO	0.2	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1962 program						
143	02.02.62	SIP	Underground Adit A-1	IPF	0.001 - 20	The first underground test of the USSR for the purposes of the IPF
144	01.08.62	SIP	Air	XIAO	2.4	
145	03.08.62	SIP	Air	XIAO	1.6	
146	04.08.62	SIP	Air	XIAO	3.8	
147	05.08.62	SPNZ	Air	XIAO	21100	
148	07.08.62	SIP	Ground	XIAO	9.9	
149	10.08.62	SPNZ	Air	XIAO	150 - 1500	
150	18.08.62	SIP	Air	XIAO	7.4	
151	18.08.62	SIP	Air	XIAO	5.8	
152	20.08.62	SPNZ	Air	XIAO	2800	
153	21.08.62	SIP	Air	XIAO	20 - 150	
154	22.08.62	SPNZ	Air	XIAO	1600	
155	22.08.62	SPNZ	Surface	XIAO	6	
156	22.08.62	SIP	Air	XIAO	3	
157	23.08.62	SIP	Air	XIAO	2.5	
158	25.08.62	SPNZ	Air	XIAO	1500 - 10000	
159	25.08.62	SIP	Air	XIAO	0.001 - 20	
160	27.08.62	SPNZ	Air	XIAO	4200	

161	27.08.62	SIP	Air	XIAO	11	
162	31.08.62	SIP	Air	FMI	2.7	
163	02.09.62	SPNZ	Air	XIAO	80	
164	08.09.62	SPNZ	Air	XIAO	1900	
165	09/15/62	SPNZ	Air	XIAO	3100	
166	09/16/62	SPNZ	Air	XIAO	3250	
167	18.09.62	SPNZ	Air	XIAO	1350	
168	19.09.62	SPNZ	Air	XIAO	1500 - 10000	
169	21.09.62	SPNZ	Air	XIAO	2400	
170	22.09.62	SIP	Ground	IAR	0.21	
171	24.09.62	SIP	Air	XIAO	1,2	
172	25.09.62	SIP	Ground	XIAO	7	
173	25.09.62	SPNZ	Air	XIAO	19100	
174	27.09.62	SPNZ	Air	XIAO	> 10000	
175	28.09.62	SIP	Air	FMI	1.3	
176	07.10.62	SPNZ	Air	XIAO	320	
177	09.10.62	SIP	Air	XIAO	8	
178	09.10.62	SPNZ	Air	XIAO	15	
179	10.10.62	SIP	Air	XIAO	9.2	
180	13.10.62	SIP	Air	XIAO	4.9	
181	14.10.62	SIP	Air	XIAO	0.001 - 20	
182	20.10.62	SIP	Air	XIAO	6.7	
183	22.10.62	SPNZ	Air	XIAO	8200	
184	22.10.62	RIP	Space	IPF	300	
185	27.10.62	SPNZ	Air	XIAO	260	
186	28.10.62	SIP	Air	XIAO	7.8	
187	28.10.62	RIP	Space	IPF	300	
188	28.10.62	SIP	Air	XIAO	7.8	
189	29.10.62	SPNZ	Air	XIAO	360	
190	10/30/62	SIP	Ground	XIAO	1,2	
191	10/30/62	SPNZ	Air	XIAO	280	
192	10/31/62	SIP	Air	XIAO	10	
193	01.11.62	SIP	Air	XIAO	3	

194	01.11.62	SPNZ	Air	XIAO	240	
195	01.11.62	RIP	High-rise	IPF	300	
196	03.11.62	SPNZ	Air	XIAO	390	
197	03.11.62	SPNZ	Air	XIAO	45	
198	03.11.62	SIP	Air	XIAO	4.7	
199	04.11.62	SIP	Air	XIAO	8.4	
200	05.11.62	SIP	Ground	IPF	0.4	
201	11.11.62	SIP	Ground	XIAO	0,1	
202	11/13/62	SIP	Ground	XIAO	< 0.001	
203	11/14/62	SIP	Air	XIAO	12	
204	11/17/62	SIP	Air	XIAO	18	
205	24.11.62	SIP	Ground	IAR	< 0.001	
206	26.11.62	SIP	Ground	IAR	0.031	
207	01.12.62	SIP	Air	XIAO	2.4	
208	18.12.62	SPNZ	Air	XIAO	110	
209	18.12.62	SPNZ	Air	FMI	69	
210	20.12.62	SPNZ	Air	XIAO	8.3	
211	22.12.62	SPNZ	Air	XIAO	6.3	
212	23.12.62	SPNZ	Air	XIAO	430	
213	23.12.62	SPNZ	Air	XIAO	8.3	
214	23.12.62	SPNZ	Air	XIAO	2.4	
215	23.12.62	SIP	Ground	IAR	< 0.001	
216	24.12.62	SIP	Ground	IAR	0,007	
217	24.12.62	SIP	Ground	IAR	0.028	
218	24.12.62	SPNZ	Air	XIAO	1100	
219	24.12.62	SPNZ	Air	XIAO	24200	
220	25.12.62	SPNZ	Air	XIAO	3100	
221	25.12.62	SPNZ	Air	XIAO	8.5	The last air-launched nuclear weapon of the USSR

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1964 program						
222	15.03.64	SIP	Adit A-6	IPF	20 - 150	
223	16.05.64	SIP	Adit A-4	XIAO	20 - 150	

224	06.06.64	SIP	Adit B-2	FMI	0.001 - 20	
225	19.07.64	SIP	Adit A-5	FMI	20 - 150	
226	18.08.64	SIP	Adit A-8Sh	XIAO	0.001 - 20	
227	18.09.64	SPNZ	Adit G	FMI	0.001 - 20	The first underground nuclear test at SIPNZ in the adit
228	30.09.64	SIP	Adit A-6Sh	FMI	0.001 - 20	
229	25.10.64	SPNZ	Adit B	OPZ	0.001 - 20	
230	11/16/64	SIP	Adit 3–5	OPZ	20 - 150	
1965 program						
231	15.01.65	SIP	“Chagan” Well 1004	PV	140	First industrial explosion; first nuclear explosion on a self-propelled insulator in a well; explosion for release
232	04.02.65	SIP	Adit A	FMI	0.001 - 20	
233	03.03.65	SIP	Adit Zh-3	XIAO	0.001 - 20	
234	27.03.65	SIP	Adit B-2P	XIAO	0.001 - 20	
235	30.03.65	Bashkir ASSR, RSFSR	“Butane-1” Well 617 “Butane-2” Well 618	PV PV	2.3 2.3	First group explosion in two wells; first nuclear explosion in the oil production intensification program
236	11.05.65	SIP	Adit A-P	XIAO	0.001 - 20	
237	10.06.65	Bashkir ASSR, RSFSR	“Butane” Well 622	PV	7.6	
238	17.06.65	SIP	Adit Zh-1	OPZ	0.001 - 20	
239	29.07.65	SIP	Adit A-1Sh	FMI	0.001 - 20	
240	17.09.65	SIP	Adit 1	XIAO	0.001 - 20	
241	08.10.65	SIP	Adit Z-1	XIAO	0.001 - 20	
242	14.10.65	SIP	Sary-Uzen Well 1003	PV	1,1	Second nuclear weapon to be ejected
243	21.11.65	SIP	Adit Zh-2	XIAO	29	

244	24.12.65	SIP	Adit Z-3	OPZ	0.001 - 20	
1966 program						
245	13.02.66	SIP	Adit E-1	OPZ	125	The most powerful nuclear explosion on the SIP in the adit
246	20.03.66	SIP	Adit 11	XIAO	100	
247	21.04.66	SIP	Adit A-4P	OPZ	0.001 - 20	
248	22.04.66	Azgir, Kazakh SSR	Well A-1	PV	1,1	First nuclear explosion at the Azgir site; first nuclear explosion to create cavities in rock salt
249	07.05.66	SIP	Adit 25	OPZ	4	
250	29.06.66	SIP	Adit Z-6	OPZ	20 - 150	
251	21.07.66	SIP	Adit 24	XIAO	20 - 150	
252	05.08.66	SIP	Adit 17	XIAO	0.001 - 20	
253	19.08.66	SIP	Adit Z-1P	OPZ	0.001 - 20	
254	07.09.66	SIP	Adit Zh-1P	FMI	0.001 - 20	
255	30.09.66	Urta-Bulak, Uzbek SSR	Well 1-c	PV	30	First use of nuclear explosives to shut off gas fountain wells
256	10/19/66	SIP	Adit 13	XIAO	20 - 150	
257	27.10.66	SPNZ	Adit A-1	XIAO	150 - 1500	
258	27.10.66	SPNZ	Adit A-2	XIAO	150 - 1500	
259	29.10.66	SIP	Adit G	XIAO	0.001 - 20	
260	11/19/66	SIP	Adit Zh-3P	XIAO	0.001 - 20	
261	03.12.66	SIP	Adit 14 Adit 14	SJAO OPZ	0.001 — 20 0.001 — 20	The first group nuclear explosion in one adit
262	18.12.66	SIP	Well 101	OPZ	20 - 150	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1967 program						

263	30.01.67	SIP	Adit 611 Adit 611	XIAO XIAO	0.001 — 20 0.001 — 20	
264	26.02.67	SIP	Adit 21	FMI	20 - 150	
265	25.03.67	SIP	Adit 19 Adit 19	XIAO IPF	0.001 — 20 0.001 — 20	
266	20.04.67	SIP	Adit 25P	OPZ	20 - 150	
267	28.05.67	SIP	Adit 11P Adit 11P	OPZ OPZ	0.001 — 20 0.001 — 20	
268	29.06.67	SIP	Adit 703	XIAO	0.001 - 20	
269	15.07.67	SIP	Adit 506	OPZ	0.001 - 20	
270	04.08.67	SIP	Adit 18 Adit 18	XIAO XIAO	0.001 — 20 0.001 — 20	
271	02.09.67	SIP	Adit 13P	XIAO	0.001 - 20	
272	09/16/67	SIP	Well 102	XIAO	0.001 - 20	
273	22.09.67	SIP	Well 105	XIAO	10	
274	06.10.67	Tyumen region, RSFSR	"Tavda" Well	PV	0.3	
275	10/17/67	SIP	Adit B Adit B	OPZ OPZ	0.001 — 20 0.001 — 20	
276	21.10.67	SPNZ	Adit A-4 Adit A-5	XIAO XIAO	150 - 1500 20 - 150	The first group nuclear explosion in two adits
277	10/30/67	SIP	Adit 501	XIAO	0.001 - 20	
278	22.11.67	SIP	Well 106	XIAO	0.001 - 20	
279	08.12.67	SIP	Adit 507	XIAO	0.001 - 20	
1968 program						
280	07.01.68	SIP	Adit 810	OPZ	0.001 - 20	
281	24.04.68	SIP	Adit 505	XIAO	0.001 - 20	

282	21.05.68	Pamuk, Uzbek SSR	Well	PV	47	
283	23.05.68	SIP	Adit 504	XIAO	< 0.001	
284	11.06.68	SIP	Adit 605	XIAO	0.001 - 20	
285	19.06.68	SIP	Well 1053	FMI	0.001 - 20	
286	01.07.68	Azgir, Kazakh SSR	Well A-II	PV	27	
287	12.07.68	SIP	Adit 608 Adit 608	XIAO XIAO	0.001 — 20 0.001 — 20	
288	20.08.68	SIP	Adit A-7 Adit A-7	XIAO IAR	0.001 - 20 < 0.001	
289	05.09.68	SIP	Adit 509	IPF	0.001 - 20	
290	29.09.68	SIP	Adit E-2	IPF	60	
291	21.10.68	SIP	"Telkem" Well 2308	PV	0.24	Third nuclear weapon to be ejected
292	29.10.68	SIP	Adit 504P	XIAO	0.001 - 20	
293	07.11.68	SPNZ	Adit A-3 Adit A-3 Adit A-3	XIAO XIAO XIAO	< 0.001 150 - 1500 150 - 1500	The first group nuclear explosion in one adit at SIPNZ
294	09.11.68	SIP	Adit 606	OPZ	0.001 - 20	
295	11/12/68	SIP	"Telkem-2" Well 2305 "Telkem-2" Well 2306 "Telkem-2" Well 2307	PV PV PV	0.24 0.24 0.24	The fourth nuclear weapon is to be ejected
296	18.12.68	SIP	Adit 508	OPZ	0.001 - 20	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1969 program						
297	07.03.69	SIP	Adit Zh-2P	XIAO	20 - 150	

298	04.04.69	SIP	Adit 19P	XIAO	0.001 - 20	
299	13.04.69	SIP	Adit 24P	OPZ	0.001 - 20	
300	16.05.69	SIP	Adit 709	XIAO	0.001 - 20	
301	31.05.69	SIP	Well 108	XIAO	0.001 - 20	
302	04.07.69	SIP	Adit 710 Adit 710	OPZ SYAO	0.001 — 20 0.001 — 20	
303	23.07.69	SIP	Adit 801	XIAO	16	
304	02.09.69	Perm region, RSFSR	“Griffin” Well 1001	PV	7.6	
305	08.09.69	Perm region, RSFSR	“Griffin” Well 1002	PV	7.6	
306	11.09.69	SIP	Adit 503 Adit 503	OPZ OPZ	0.001 — 20 0.001 — 20	
307	26.09.69	Takhta-Kugulta, Stavropol Krai, Russian SFSR	Well	PV	10	Application of nuclear explosives to intensify gas production
308	01.10.69	SIP	Adit 607 Adit 607	XIAO XIAO	0.001 — 20 0.001 — 20	
309	14.10.69	SPNZ	Adit A-7 Adit A-7 Adit A-9	XIAO XIAO XIAO	20 - 150 150 - 1500 150 - 1500	
310	10/30/69	SIP	Adit 506P	IAR	0.001 - 20	
311	27.11.69	SIP	Adit 511	OPZ	0.001 - 20	
312	11/30/69	SIP	Well 1054	XIAO	125	
313	06.12.69	Mangyshlak, Kazakh SSR	Well 2-T	PV	30	
314	28.12.69	SIP	Well 107	XIAO	40	
315	29.12.69	SIP	Adit III-1	OPZ	0.001 - 20	
1970 program						

316	29.01.70	SIP	Adit 802 Adit 802 Adit 802	IPF IPF IPF	0.001 - 20 0.001 - 20 0.001 - 20	
317	18.02.70	SIP	Adit III-2	IAR	< 0.001	
318	27.03.70	SIP	Adit 610	OPZ	0.001 - 20	
319	27.05.70	SIP	Adit III-3	XIAO	0.001 - 20	
320	25.06.70	Orenburg region, RSFSR	“Magistral” Well 1T–2S	PV	2,3	First nuclear power plant for creating gas storage tanks
321	28.06.70	SIP	Adit 510	XIAO	20 - 150	
322	28.06.70	SIP	Adit 705 Adit 705	OPZ SYAO	0.001 — 20 0.001 — 20	
323	21.07.70	SIP	Well 104	XIAO	0.001 - 20	
324	24.07.70	SIP	Adit 120	XIAO	0.001 - 20	
325	06.09.70	SIP	Adit 502	XIAO	0.001 - 20	
326	06.09.70	SIP	Adit 8	OPZ	0.001 - 20	
327	14.10.70	SPNZ	Adit A–6 Adit A–6 Adit A–6	XIAO XIAO XIAO	150 - 1500 150 - 1500 150 - 1500	
328	04.11.70	SIP	Well 125	OPZ	0.001 - 20	
329	12.12.70	Mangyshlak, Kazakh SSR	Well 6T	PV	80	
330	12/17/70	SIP	Adit 193	XIAO	20 - 150	
331	23.12.70	Mangyshlak, Kazakh SSR	Well 1-T	PV	75	
1971 program						
332	29.01.71	SIP	Adit 114	IPF	0.001 - 20	
333	22.03.71	SIP	Adit 510P	OPZ	20 - 150	
334	22.03.71	SIP	Adit 807	XIAO	0.001 - 20	

335	23.03.71	Perm region, RSFSR	“Taiga” Well 1B Well 2B Well 3B	PV PV PV	15 15 15	Fifth nuclear waste discharge. Creation of a channel within the framework of the project to divert part of the flow of northern rivers into the Volga basin.
336	09.04.71	SIP	Adit 148/1	PV	0.23	
337	25.04.71	SIP	Adit 706	XIAO	90	
338	25.05.71	SIP	Adit 119	XIAO	0.001 - 20	
339	06.06.71	SIP	Well 110	XIAO	16	
340	19.06.71	SIP	Well 129	XIAO	0.001 - 20	
341	30.06.71	SIP	Well 1056	XIAO	0.001 - 20	
342	02.07.71	Komi ASSR, RSFSR	"Globus" Well GB-4	PV (sz)	2,3	The first nuclear explosion in the seismic sounding program (sz)
343	10.07.71	Komi ASSR, RSFSR	"Globus" Well GB-3	PV (sz)	2,3	
344	19.09.71	Ivanovo region, RSFSR	"Globus" Well GB-1	PV (sz)	2,3	
345	27.09.71	SPNZ	Adit A-8 Adit A-8 Adit A-8 Adit A-8	XIAO XIAO XIAO XIAO	150 - 1500 150 - 1500 150 - 1500 150 - 1500	
346	04.10.71	Arkhangelsk region, RSFSR	"Globus" Well GB-2	PV (sz)	2,3	
347	09.10.71	SIP	Well 111	XIAO	12	
348	21.10.71	SIP	Well 127	XIAO	23	
349	22.10.71	Orenburg region, RSFSR	“Sapphire” Well E-2	PV	15	
350	29.11.71	SIP	Adit 105 Adit 105	XIAO XIAO	0.001 — 20 0.001 — 20	
351	12/15/71	SIP	Adit 157	IPF	0.001 - 20	
352	22.12.71	Azgir, Kazakh SSR	Well A-III	PV	64	
353	12/30/71	SIP	Adit 809	XIAO	0.001 - 20	
354	12/30/71	SIP	Adit 609	XIAO	20 - 150	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1972 program						
355	10.02.72	SIP	Well 1007	XIAO	16	
356	10.03.72	SIP	Adit 201 Adit 201	XIAO XIAO	0.001 — 20 0.001 — 20	
357	28.03.72	SIP	Adit 191 Adit 191 Adit 191	SJAO OPZ IAR	0.001 - 20 0.001 - 20 < 0.001	
358	11.04.72	Mary, Turkmen SSR	"Crater" Well	PV	15	
359	20.04.72	SIP	Adit 505P	IAR	< 0.001	
360	07.06.72	SIP	Adit 110	XIAO	0.001 - 20	
361	07.06.72	SIP	Adit 601	IPF	0.001 - 20	
362	06.07.72	SIP	Adit 157-M	IPF	0.001 - 20	
363	09.07.72	Ukrainian SSR	"Torch" Well	PV	3.8	
364	27.07.72	SPNZ	Well U-3	FMI	0.001 - 20	
365	16.08.72	SIP	Adit 708	IPF	8	
366	20.08.72	Kazakh SSR	"Region" Well R-3	PV (sz)	6.6	
367	26.08.72	SIP	Well 132	XIAO	0.001 - 20	
368	28.08.72	SPNZ	Adit A-16 Adit A-16 Adit A-16 Adit A-16	XIAO XIAO XIAO XIAO	150 - 1500 20 - 150 150 - 1500 150 - 1500	
369	02.09.72	SIP	Well 128	XIAO	2	
370	04.09.72	Murmansk region, RSFSR	"Dnepr-1" Adit	PV	2.1	First nuclear power plant to test ore crushing technology
371	21.09.72	Orenburg region, RSFSR	"Region" Well R-1	PV (sz)	2,3	
372	03.10.72	Kalmyk ASSR,	"Region" Well R-4	PV (sz)	6.6	

		RSFSR				
373	02.11.72	SIP	Well 1061	XIAO	165	The most powerful underground test on the SIP (well)
374	24.11.72	Orenburg region, RSFSR	"Region" Well R-2	PV (sz)	2,3	
375	24.11.72	Kazakh SSR	"Region" Well R-5	PV (sz)	6.6	
376	10.12.72	SIP	Adit 3–2 Adit 140	XIAO XIAO	0.001 — 20 20 — 150	The first group nuclear explosion in two adits on the SIP
377	10.12.72	SIP	Well 1204	OPZ	140	
378	28.12.72	SIP	Adit 25PP	XIAO	0.001 - 20	
1973 program						
379	16.02.73	SIP	Adit 113	XIAO	20 - 150	
380	19.04.73	SIP	Well 131	XIAO	0.001 - 20	
381	10.07.73	SIP	Adit 806 Adit 806 Adit 806	XIAO XIAO IAR	0.001 - 20 0.001 - 20 < 0.001	
382	23.07.73	SIP	Well 1066	OPZ	150 - 1500	
383	15.08.73	Kazakh SSR	"Meridian" Well MN-3	PV (sz)	6.3	
384	28.08.73	Kazakh SSR	"Meridian" Well MN-1	PV (sz)	6.3	
385	12.09.73	SPNZ	Adit B-1 Adit B-1 Adit B-1 Adit B-1	XIAO XIAO XIAO XIAO	1500 - 10000 150 - 1500 150 - 1500 150 - 1500	The most powerful underground test of the USSR
386	19.09.73	Kazakh SSR	"Meridian" Well MN-2	PV (sz)	6.3	
387	20.09.73	SIP	Well 1267	XIAO	< 0.001	
388	27.09.73	SPNZ	Well U-4	FMI	20 - 150	
389	30.09.73	Orenburg region, RSFSR	"Sapphire" Well E-3	PV	10	
390	26.10.73	Bashkir ASSR, RSFSR	"Kama-2" Well	PV	10	The first nuclear power plant for the disposal of

						petrochemical industrial wastewater
391	26.10.73	SIP	Adit 205	IPF	0.001 - 20	
392	27.10.73	SPNZ	Well U-1	XIAO	1500 - 10000	Most Powerful Underground Well Test
393	04.11.73	SIP	Well 1069	XIAO	0.001 - 20	
394	14.12.73	SIP	Well 1064	XIAO	20 - 150	
395	31.12.73	SIP	Adit 21P	XIAO	0.001 - 20	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1974 program						
396	30.01.74	SIP	Adit 603 Adit 603 Adit 603	IPF IPF IPF	0.001 - 20 0.001 - 20 0.001 - 20	The test was classified as a group nuclear test due to its specificity, although the time difference between the explosions was more than 0.1 seconds.
397	28.02.74	SIP	Adit 110P	IAR	< 0.001	
398	16.04.74	SIP	Well 1301	XIAO	0.001 - 20	
399	16.05.74	SIP	Adit 176	XIAO	0.001 - 20	
400	31.05.74	SIP	Well 1207	OPZ	20 - 150	
401	25.06.74	SIP	Adit Z-1PP	IPF	0.001 - 20	
402	08.07.74	Bashkir ASSR, RSFSR	“Kama-1” Well	PV	10	
403	10.07.74	SIP	Adit 195	XIAO	0.001 - 20	
404	29.07.74	SIP	Well 1050	XIAO	0.001 - 20	
405	14.08.74	Tyumen region, RSFSR	“Horizon” Well G-2	PV (sz)	7.6	
406	29.08.74	Komi ASSR, RSFSR	“Horizon” Well G-1	PV (sz)	7.6	
407	29.08.74	SPNZ	Adit A-11 Adit A-11	XIAO XIAO	150 - 1500	

			Adit A-11 Adit A-11 Adit A-11	XIAO XIAO	150 - 1500 20 - 150 0.001 - 20 150 - 1500	
408	13.09.74	SIP	Adit 179	IPF	0.001 - 20	
409	02.10.74	Yakut ASSR, RSFSR	"Crystal" Well	PV	1.7	
410	16.10.74	SIP	Well 1005	IPF	0.001 - 20	
411	02.11.74	SPNZ	Well Y-5N	XIAO	1500 - 10000	
412	28.11.74	SIP	Well 215	XIAO	0.001 - 20	
413	07.12.74	SIP	"Lazurit" Well R-1	PV	1.7	
414	16.12.74	SIP	Adit 709P	XIAO	0.001 - 20	
415	16.12.74	SIP	Adit 148/5	PV	3.8	
416	27.12.74	SIP	Well 1058	XIAO	20 - 150	
1975 program						
417	20.02.75	SIP	Adit 163 Adit 163 Adit 163	IPF IPF IPF	0.001 - 20 0.001 - 20 0.001 - 20	
418	20.02.75	SIP	Adit 156	IPF	0.001 - 20	
419	11.03.75	SIP	Adit 101	XIAO	0.001 - 20	
420	25.04.75	Azgir, Kazakh SSR	Well A-II-2	PV	0.35	The first repeated nuclear explosion in the cavity of a rock salt massif formed by nuclear explosion
421	27.04.75	SIP	Well 1205	XIAO	20 - 150	
422	08.06.75	SIP	Adit 165	OPZ	0.001 - 20	
423	30.06.75	SIP	Well A	XIAO	0.001 - 20	
424	15.07.75	SIP	Adit 133 Adit 133	XIAO XIAO	0.001 — 20	

					0.001 — 20	
425	07.08.75	SIP	Adit 122 Adit 123	XIAO XIAO	0.001 — 20 0.001 — 20	
426	12.08.75	Yakut ASSR, RSFSR	“Horizon” Well G-4	PV (sz)	7.6	
427	23.08.75	SPNZ	Adit A-10 Adit A-10 Adit A-10 Adit A-10 Adit A-10 Adit A-10 Adit A-10 Adit A-10	IPF IPF IPF IPF XIAO XIAO XIAO	150 - 1500 0.001 - 20 150 - 1500 0.001 - 20 20 - 150 150 - 1500 150 - 1500 20 - 150	The first group nuclear explosion with the maximum number of explosions (8) at SIPNZ
428	29.09.75	Krasnoyarsk region, RSFSR	“Horizon” Well G-3	PV (sz)	7.6	
429	05.10.75	SIP	Adit 192	XIAO	0.001 - 20	
430	18.10.75	SPNZ	Well Yu-6N Well Yu-6N	XIAO XIAO	150 - 1500 150 - 1500	The first group nuclear explosion in one well at SIPNZ
431	18.10.75	SPNZ	Well U-7	XIAO	150 - 1500	
432	21.10.75	SPNZ	Adit A-12 Adit A-12 Adit A-12 Adit A-12 Adit A-12	XIAO XIAO XIAO XIAO	150 - 1500 150 - 1500 20 - 150 150 - 1500 150 - 1500	
433	29.10.75	SIP	Well 1206	XIAO	20 - 150	
434	13.12.75	SIP	Adit 604	XIAO	0.001 - 20	
435	25.12.75	SIP	Well 1067	XIAO	20 - 150	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1976 program						
436	15.01.76	SIP	Adit 115	XIAO	0.001 - 20	
437	17.03.76	SIP	Adit 608P	XIAO	0.001 - 20	
438	29.03.76	Azgir, Kazakh SSR	Well A-III-2	PV	10	
439	10.04.76	SIP	Adit 609P	XIAO	0.001 - 20	
440	21.04.76	SIP	Well 1201	XIAO	0.001 - 20	
441	21.04.76	SIP	Adit 101P	XIAO	0.001 - 20	
442	19.05.76	SIP	Adit 163P	XIAO	0.001 - 20	
443	09.06.76	SIP	Well 1075	XIAO	0.001 - 20	
444	04.07.76	SIP	Well 1062	XIAO	20 - 150	
445	23.07.76	SIP	Adit 185	XIAO	0.001 - 20	
446	29.07.76	Azgir, Kazakh SSR	Well A-IV	PV	58	
447	04.08.76	SIP	Well 133	XIAO	0.001 - 20	
448	28.08.76	SIP	Well 1202	XIAO	20 - 150	
449	29.09.76	SPNZ	Adit A-14 Adit A-14	XIAO XIAO	20 — 150 20 — 150	
450	20.10.76	SPNZ	Adit A-15 Adit A-15 Adit A-15 Adit A-15	XIAO XIAO FMI IAR	0.001 - 20 0.001 - 20 0.001 - 20 < 0.001	
451	10/30/76	SIP	Adit 143	IPF	0.001 - 20	
452	05.11.76	Yakut ASSR, RSFSR	"Oka" Well 42	PV	15	
453	23.11.76	SIP	Well 1207bis	XIAO	20 - 150	
454	07.12.76	SIP	Well 1304 Well 1304	XIAO XIAO	20 — 150 0.001 — 20	The first group nuclear explosion in

						one well on the SIP
455	07.12.76	SIP	Well 1209	XIAO	0.001 - 20	
456	12/30/76	SIP	Adit 706P Adit 706P	XIAO XIAO	0.001 — 20 0.001 — 20	
1977 program						
457	29.03.77	SIP	Adit 707 Adit 707 Adit 707	XIAO XIAO IAR	0.001 - 20 0.001 - 20 < 0.001	
458	29.03.77	SIP	Well 130	XIAO	20 - 150	
459	25.04.77	SIP	Adit 604P	XIAO	0.001 - 20	
460	29.05.77	SIP	Well 1400	XIAO	20 - 150	
461	29.06.77	SIP	Well 1080	XIAO	0.001 - 20	
462	26.07.77	Krasnoyarsk region, RSFSR	"Meteorite" Well M2	PV (sz)	15	
463	30.07.77	SIP	Adit 175 Adit 175	XIAO XIAO	0.001 — 20 0.001 — 20	
464	11.08.77	Chita region, RSFSR	"Meteorite" Well M5	PV (sz)	8.5	
465	17.08.77	SIP	Adit 111	XIAO	0.001 - 20	
466	21.08.77	Krasnoyarsk region, RSFSR	"Meteorite" Well M3	PV (sz)	8.5	
467	01.09.77	SPNZ	Adit A-17 Adit A-17 Adit A-17 Adit A-17	XIAO XIAO XIAO XIAO	0.001 - 20 0.001 - 20 0.001 - 20 20 - 150	
468	05.09.77	SIP	Well 1079 Well 1079	XIAO FMI	20 — 150 0.001 — 20	
469	10.09.77	Irkutsk region, RSFSR	"Meteorite" Well M4	PV (sz)	7.6	
470	30.09.77	Azgir, Kazakh SSR	Well A-V	PV	10	

471	09.10.77	SPNZ	Adit A-7P	XIAO	0.001 - 20	
472	14.10.77	Azgir, Kazakh SSR	Well A-II-3	PV	0,1	
473	29.10.77	SIP	Adit 136 Adit 136	XIAO FMI	0.001 — 20 0.001 — 20	
474	29.10.77	SIP	Well 1214	XIAO	20 - 150	
475	10/30/77	Azgir, Kazakh SSR	Well A-II-4	PV	0.01	
476	11/12/77	SIP	Well 1073	XIAO	0.001 - 20	
477	27.11.77	SIP	Adit 18P	XIAO	0.001 - 20	
478	11/30/77	SIP	Well Deep Well Deep	XIAO XIAO	20 — 150 0.001 — 20	
479	26.12.77	SIP	Adit 803	XIAO	0.001 - 20	
480	26.12.77	SIP	Adit 123P Adit 122P Adit 122P Adit 122P	XIAO XIAO XIAO XIAO	0.001 - 20 < 0.001 0.001 - 20 0.001 - 20	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1978 program						
481	19.03.78	SIP	Well 2691	XIAO	0.001 - 20	
482	26.03.78	SIP	Adit 701 Adit 701	XIAO XIAO	0.001 — 20 0.001 — 20	
483	22.04.78	SIP	Adit 204 Adit 204 Adit 204	XIAO XIAO XIAO	0.001 - 20 0.001 - 20 0.001 - 20	
484	24.05.78	SIP	Adit 185P	IAR	< 0.001	
485	29.05.78	SIP	Adit 133P	IPF	0.001 - 20	
486	02.06.78	SIP	Adit 185PP	IAR	< 0.001	

487	11.06.78	SIP	Well 1010	XIAO	20 - 150	
488	05.07.78	SIP	Well 1077	XIAO	20 - 150	
489	28.07.78	SIP	Adit 104 Adit 104 Adit 104 Adit 104 Adit 104	XIAO XIAO XIAO XIAO	20 - 150 0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20	Group nuclear explosion with maximum number of explosions (5) on SIP
490	09.08.78	Yakut ASSR, RSFSR	“Kraton” Well KR-4	PV (sz)	22	
491	10.08.78	SPNZ	Adit A-18 Adit A-18 Adit A-18 Adit A-18 Adit A-18 Adit A-18	XIAO XIAO XIAO XIAO FMI	0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20 20 - 150 0.001 - 20	
492	24.08.78	Yakut ASSR, RSFSR	“Kraton” Well KR-3	PV (sz)	22	
493	29.08.78	SIP	Adit 107 Adit 107 Adit 107	XIAO XIAO IAR	0.001 - 20 0.001 - 20 < 0.001	
494	29.08.78	SIP	Well 1228	XIAO	20 - 150	
495	12.09.78	Azgir, Kazakh SSR	Well A-II-5	PV	0.08	
496	15.09.78	SIP	Well 1211	XIAO	20 - 150	
497	20.09.78	SIP	Adit 605P	IPF	0.001 - 20	
498	21.09.78	Krasnoyarsk region, RSFSR	“Kraton” Well KR-2	PV (sz)	15	
499	27.09.78	SPNZ	Adit A-19 Adit A-19 Adit A-19 Adit A-19 Adit A-19 Adit A-19 Adit A-19	XIAO XIAO XIAO XIAO XIAO IAR	20 - 150 0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20 < 0.001	
500	08.10.78	Yakut ASSR, RSFSR	"Vyatka" Well 43	PV	15	

501	15.10.78	SIP	Adit 200ASM	IPF	0.001 - 20	
502	17.10.78	Azgir, Kazakh SSR	Well A-VII Well A-VII	PV PV	20 — 150 0.001 — 20	The first group nuclear explosion at the Azgir site (total energy release was 73 kt)
503	17.10.78	Tyumen region, RSFSR	“Kraton” Well KR-1	PV (sz)	22	
504	10/31/78	SIP	Adit 194	FMI	0.001 - 20	
505	04.11.78	SIP	Well 1302 Well 1302	XIAO XIAO	20 — 150 0.001 — 20	
506	29.11.78	SIP	Well 1222 Well 1222	XIAO XIAO	20 — 150 0.001 — 20	
507	29.11.78	SIP	Adit 162	XIAO	0.001 - 20	
508	11/30/78	Azgir, Kazakh SSR	Well A-II-6	PV	0.06	
509	14.12.78	SIP	Adit 113P	XIAO	0.001 - 20	
510	18.12.78	Azgir, Kazakh SSR	Well A-IX	PV	103	
511	20.12.78	SIP	Adit 803P Adit 803P	XIAO XIAO	0.001 — 20 0.001 — 20	
1979 program						
512	10.01.79	Azgir, Kazakh SSR	Well A-II-7	PV	0.5	
513	17.01.79	Azgir, Kazakh SSR	Well A-VIII Well A-VIII	PV PV	0.001 — 20 20 — 150	The total energy release was 65 kt.
514	01.02.79	SIP	Well 1006	XIAO	0.001 - 20	
515	16.02.79	SIP	Well 109 Well 2803	XIAO XIAO	0.001 — 20 0.001 — 20	
516	23.03.79	SIP	Adit 115P	IAR	< 0.001	
517	10.04.79	SIP	Adit 115PP	IAR	< 0.001	
518	06.05.79	SIP	Adit 701P Adit 701P	XIAO XIAO	0.001 — 20	

					0.001 — 20	
519	31.05.79	SIP	Adit 141 Adit 141 Adit 141 Adit 136P	XIAO XIAO XIAO XIAO	0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20	
520	12.06.79	SIP	Adit 115PPP	IAR	< 0.001	
521	23.06.79	SIP	Well 1223	XIAO	20 - 150	
522	07.07.79	SIP	Well 1225 Well 1225	XIAO XIAO	20 — 150 0.001 — 20	
523	14.07.79	Azgir, Kazakh SSR	Well A-IX Well A-IX Well A-IX	PV PV PV	0.001 - 20 0.001 - 20 0.001 - 20	The total energy release was 21 kt.
524	18.07.79	SIP	Well 2613	XIAO	0.001 - 20	
525	18.07.79	SIP	Adit 195P	FMI	0.001 - 20	
526	04.08.79	SIP	Well 1085 Well 1085	XIAO XIAO	0.001 — 20 20 — 150	
527	12.08.79	Yakut ASSR, RSFSR	"Kimberlite" Well KM-4	PV (sz)	8.5	
528	18.08.79	SIP	Well 1226 Well 1226	XIAO XIAO	20 — 150 0.001 — 20	
529	06.09.79	Krasnoyarsk region, RSFSR	"Kimberlite" Well KM-3	PV (sz)	8.5	
530	16.09.79	Ukrainian SSR	"Cleavage" Mine	PV	0.3	
531	24.09.79	SPNZ	Adit A-32 Adit A-32 Adit A-32	XIAO XIAO XIAO	20 - 150 0.001 - 20 0.001 - 20	
532	27.09.79	SIP	Adit 175P	IPF	0.001 - 20	
533	04.10.79	Tyumen region, RSFSR	"Kimberlite" Well KM-1	PV (sz)	22	

534	08.10.79	Yakut ASSR, RSFSR	"Sheksna" Well 47	PV	15	
535	18.10.79	SIP	Adit 128 Adit 128	XIAO XIAO	0.001 — 20 0.001 — 20	
536	18.10.79	SPNZ	Adit A-20 Adit A-20 Adit A-20 Adit A-20	XIAO XIAO XIAO XIAO	20 - 150 0.001 - 20 20 - 150 0.001 - 20	
537	24.10.79	Azgir, Kazakh SSR	Well A-X Well A-X	PV PV	0.001 — 20 20 — 150	The last nuclear explosion at the Azgir site (total energy release was 33 kt)
538	28.10.79	SIP	Well 1224 Well 1224	XIAO XIAO	0.001 — 20 20 — 150	
539	11/30/79	SIP	Adit 192P	XIAO	0.001 - 20	
540	02.12.79	SIP	Well 1309 Well 1309	XIAO FMI	0.001 — 20 20 — 150	
541	21.12.79	SIP	Adit 802P	XIAO	0.001 - 20	
542	23.12.79	SIP	Well Deep-1 Well Deep-1	XIAO XIAO	20 — 150 0.001 — 20	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1980 program						
543	14.03.80	SIP	Adit 603P	IAR	< 0.001	
544	04.04.80	SIP	Well 126	XIAO	0.001 - 20	
545	10.04.80	SIP	Adit 181 Adit 181	XIAO XIAO	0.001 — 20 0.001 — 20	
546	25.04.80	SIP	Well 1071 Well 1071	XIAO XIAO	0.001 — 20 0.001 — 20	

547	22.05.80	SIP	Adit 173 Adit 173 Adit 173	XIAO XIAO XIAO	0.001 - 20 0.001 - 20 0.001 - 20	
548	12.06.80	SIP	Well 1083	XIAO	20 - 150	
549	16.06.80	Bashkir ASSR, RSFSR	“Butane” Well 1	PV	3.2	
550	25.06.80	Bashkir ASSR, RSFSR	“Butane” Well 3	PV	3.2	
551	25.06.80	SIP	Adit 127	XIAO	0.001 - 20	
552	29.06.80	SIP	Well 1227 Well 1227 Well 1227	XIAO XIAO XIAO	0.001 - 20 0.001 - 20 20 - 150	
553	31.07.80	SIP	Adit 902 Adit 902	XIAO XIAO	0.001 — 20 0.001 — 20	
554	14.09.80	SIP	Well 1220	XIAO	20 - 150	
555	25.09.80	SIP	Adit K-1	IPF	0.001 - 20	
556	08.10.80	Astrakhan region, RSFSR	"Vega" Well 1T	PV	8.5	
557	11.10.80	SPNZ	Adit A-25 Adit A-25 Adit A-25 Adit A-25 Adit A-30 Adit A-30 Adit A-30	XIAO XIAO XIAO XIAO XIAO XIAO XIAO	20 - 150 0.001 - 20 0.001 - 20 20 - 150 0.001 - 20 0.001 - 20 0.001 - 20	
558	12.10.80	SIP	Well 1087 Well 1087	XIAO XIAO	20 — 150 20 — 150	
559	23.10.80	SIP	Adit 204P	XIAO	0.001 - 20	
560	01.11.80	Krasnoyarsk region, RSFSR	“Batholith” Well BT-1	PV (sz)	8	
561	05.12.80	SIP	Adit 204PP	XIAO	0.001 - 20	
562	05.12.80	SIP	Adit 111P Adit 111P Adit 111P	XIAO XIAO XIAO	0.001 - 20 0.001 -	

					20 0.001 - 20	
563	10.12.80	Tyumen region, RSFSR	"Angara" Well	PV	15	
564	14.12.80	SIP	Well 1086 Well 1086 Well 1086	XIAO XIAO XIAO	0.001 - 20 0.001 - 20 20 - 150	
565	26.12.80	SIP	Adit Z-2P	XIAO	0.001 - 20	
566	27.12.80	SIP	Well 1303 Well 1303	XIAO XIAO	20 — 150 0.001 — 20	
1981 program						
567	25.03.81	SIP	Adit 603-PP	IAR	< 0.001	
568	29.03.81	SIP	Well 1234 Well 1234 Well 1234	XIAO FMI FMI	0.001 - 20 0.001 - 20 0.001 - 20	
569	22.04.81	SIP	Well 1232 Well 1232 Well 1232	XIAO XIAO XIAO	20 - 150 0.001 - 20 0.001 - 20	
570	25.05.81	Arkhangelsk region, RSFSR	"Pirite" Well	PV	37.6	
571	27.05.81	SIP	Well 1203	XIAO	0.001 - 20	
572	04.06.81	SIP	Adit 603-PPP	IAR	< 0.001	
573	30.06.81	SIP	Adit 187 Adit 187	XIAO XIAO	0.001 — 20 0.001 — 20	
574	17.07.81	SIP	Adit 106	XIAO	0.001 - 20	
575	14.08.81	SIP	Adit 184 Adit 184 Adit 184	XIAO XIAO XIAO	0.001 - 20 0.001 - 20 0.001 - 20	
576	02.09.81	Perm region, RSFSR	"Helium" Well 401	PV	3.2	
577	13.09.81	SIP	Well 1233	XIAO	20 - 150	
578	26.09.81	Astrakhan region, RSFSR	"Vega" Well 2T/2	PV	8.5	

579	26.09.81	Astrakhan region, RSFSR	"Vega" Well 4T/2	PV	8.5	
580	01.10.81	SPNZ	Adit A-23 Adit A-23 Adit A-23 Adit A-23	XIAO XIAO XIAO XIAO	20 - 150 0.001 - 20 0.001 - 20 0.001 - 20	
581	16.10.81	SIP	Adit 136-PP	IAR	< 0.001	
582	18.10.81	SIP	Well 1236 Well 1236	XIAO XIAO	20 — 150 0.001 — 20	
583	22.10.81	Krasnoyarsk region, RSFSR	“Spat” Well ShP-2	PV	8.5	
584	20.11.81	SIP	Adit 103 Adit 103	XIAO XIAO	0.001 — 20 0.001 — 20	
585	29.11.81	SIP	Well 1237 Well 1237 Well 1237	XIAO XIAO XIAO	0.001 - 20 0.001 - 20 0.001 - 20	
586	22.12.81	SIP	Adit 135 Adit 135 Adit 135	XIAO XIAO XIAO	0.001 - 20 0.001 - 20 0.001 - 20	
587	27.12.81	SIP	Well 1312	XIAO	20 - 150	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1982 program						
588	19.02.82	SIP	Adit 150 Adit 150	XIAO XIAO	0.001 — 20 0.001 — 20	
589	25.04.82	SIP	Well 1219 Well 1219 Well 1219	FMI FMI FMI	20 - 150 20 - 150 20 - 150	
590	25.06.82	SIP	Adit 196 Adit 196	IPF SYA	0.001 — 20 0.001 — 20	

591	04.07.82	SIP	Well 1321 Well 1321 Well 1321	XIAO XIAO XIAO	0.001 - 20 20 - 150 0.001 - 20	
592	31.07.82	Irkutsk region, RSFSR	“Rift” Well RF-3	PV (sz)	8.5	
593	23.08.82	SIP	Adit 14P Adit 14P	XIAO XIAO	0.001 — 20 0.001 — 20	
594	31.08.82	SIP	Well 1317 Well 1317	XIAO XIAO	0.001 — 20 0.001 — 20	
595	04.09.82	Krasnoyarsk region, RSFSR	“Rift” Well RF-1	PV (sz)	16	
596	21.09.82	SIP	Adit 203 Adit 203	XIAO XIAO	0.001 — 20 0.001 — 20	
597	25.09.82	Krasnoyarsk region, RSFSR	“Rift” Well RF-4	PV (sz)	8.5	
598	10.10.82	Yakut ASSR, RSFSR	“Neva” Well 66	PV	15	
599	11.10.82	SPNZ	Adit A-37 Adit A-37 Adit A-37 Adit A-37	XIAO XIAO XIAO XIAO	0.001 - 20 20 - 150 0.001 - 20 0.001 - 20	
600	16.10.82	Astrakhan region, RSFSR	"Vega" Well 3T	PV	13.5	
601	16.10.82	Astrakhan region, RSFSR	“Vega” Well 5T	PV	8.5	
602	16.10.82	Astrakhan region, RSFSR	"Vega" Well 6T	PV	8.5	
603	16.10.82	Astrakhan region, RSFSR	"Vega" Well 7T	PV	8.5	
604	05.12.82	SIP	Well 1314 Well 1314	XIAO XIAO	20 — 150 0.001 — 20	
605	25.12.82	SIP	Adit 172 Adit 172	XIAO XIAO	0.001 — 20 0.001 — 20	
606	26.12.82	SIP	Well 1415 Well 1415	FMI XIAO	20 — 150 20 — 150	

1983 program						
607	11.03.83	SIP	Adit 150P	IAR	< 0.001	
608	30.03.83	SIP	Adit 177	XIAO	0.001 - 20	
609	12.04.83	SIP	Adit 186	IPF	0.001 - 20	
610	30.05.83	SIP	Adit 215 Adit 215	FMI XIAO	0.001 — 20 0.001 — 20	
611	12.06.83	SIP	Well 1320 Well 1320	XIAO XIAO	20 — 150 0.001 — 20	
612	24.06.83	SIP	Adit 176P	XIAO	0.001 - 20	
613	20.07.83	Kazakh SSR	“Lira” Well 1T	PV	15	
614	20.07.83	Kazakh SSR	"Lira" Well 2T	PV	15	
615	20.07.83	Kazakh SSR	"Lira" Well 3T	PV	15	
616	18.08.83	SPNZ	Adit A-40 Adit A-40 Adit A-40 Adit A-40 Adit A-40	XIAO XIAO OPZ IAR	20 - 150 0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20	
617	11.09.83	SIP	Adit K-2	IPF	0.001 - 20	
618	24.09.83	Astrakhan region, RSFSR	"Vega" Well 8RT	PV	8.5	
619	24.09.83	Astrakhan region, RSFSR	"Vega" Well 9RT	PV	8.5	
620	24.09.83	Astrakhan region, RSFSR	"Vega" Well 10RT	PV	8.5	
621	24.09.83	Astrakhan region, RSFSR	"Vega" Well 11RT	PV	8.5	
622	24.09.83	Astrakhan region, RSFSR	“Vega” Well 12RT	PV	8.5	
623	24.09.83	Astrakhan region, RSFSR	“Vega” Well 13RT	PV	8.5	
624	25.09.83	SPNZ	Adit A-21 Adit A-21 Adit A-21 Adit A-21	XIAO XIAO XIAO IPF	20 - 150 0.001 - 20 0.001 - 20 0.001 - 20	

625	06.10.83	SIP	Well 1325 Well 1325	XIAO XIAO	20 — 150 0.001 — 20	
626	26.10.83	SIP	Well 1307	XIAO	20 - 150	
627	02.11.83	SIP	Adit 203P	XIAO	0.001 - 20	
628	20.11.83	SIP	Well 1235 Well 1235	XIAO XIAO	0.001 — 20 0.001 — 20	
629	29.11.83	SIP	Adit 216	XIAO	0.001 - 20	
630	29.11.83	SIP	Adit 180 Adit 180	XIAO XIAO	0.001 — 20 0.001 — 20	
631	26.12.83	SIP	Adit 129	FMI	0.001 - 20	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1984 program						
632	19.02.84	SIP	Well 1331	XIAO	20 - 150	
633	07.03.84	SIP	Well 1308	XIAO	20 - 150	
634	29.03.84	SIP	Well 1335	XIAO	20 - 150	
635	15.04.84	SIP	Adit 190 Adit 190	XIAO XIAO	20 — 150 0.001 — 20	
636	25.04.84	SIP	Well 1316 Well 1316	XIAO XIAO	20 — 150 0.001 — 20	
637	26.05.84	SIP	Well 1414 Well 1414	XIAO XIAO	20 — 150 0.001 — 20	
638	14.07.84	SIP	Well 1344 Well 1344	XIAO XIAO	20 — 150 0.001 — 20	
639	21.07.84	Kazakh SSR	"Lira" Well 4T	PV	15	
640	21.07.84	Kazakh SSR	"Lira" Well 5T	PV	15	
641	21.07.84	Kazakh SSR	"Lira" Well 6T	PV	15	
642	11.08.84	Komi ASSR, RSFSR	"Quartz" Well K-2	PV	8.5	

643	25.08.84	Tyumen region, RSFSR	“Quartz” Well K-3	PV	8.5	
644	26.08.84	SPNZ	Adit A-100	IPF	0.001 - 20	
645	27.08.84	Murmansk region, RSFSR	Adit "Dnepr-2" Adit "Dnepr-2"	PV PV	1.7 1.7	
646	28.08.84	Perm region, RSFSR	"Helium" Well 402	PV	3.2	
647	28.08.84	Perm region, RSFSR	"Helium" Well 403	PV	3.2	
648	09.09.84	SIP	Adit 132 Adit 132 Adit 132 Adit 132	IPF IPF IPF IPF	0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20	
649	18.09.84	Kemerovo region, RSFSR	“Quartz” Well K-4	PV	10	
650	18.10.84	SIP	Adit 200M-bis	IPF	0.001 - 20	
651	25.10.84	SPNZ	Adit A-26 Adit A-26 Adit A-26 Adit A-26	XIAO XIAO XIAO XIAO	0.001 - 20 0.001 - 20 0.001 - 20 20 - 150	
652	27.10.84	Astrakhan region, RSFSR	"Vega" Well 14RT	PV	3.2	
653	27.10.84	Astrakhan region, RSFSR	“Vega” Well 15RT	PV	3.2	
654	27.10.84	SIP	Well 1323	XIAO	20 - 150	
655	23.11.84	SIP	Adit 803bis Adit 803bis Adit 803bis	XIAO XIAO XIAO	0.001 - 20 0.001 - 20 0.001 - 20	
656	02.12.84	SIP	Well 1411 Well 1411	XIAO FMI	20 — 150 0.001 — 20	
657	16.12.84	SIP	Well 1313 Well 1313	XIAO XIAO	20 — 150 0.001 — 20	

658	28.12.84	SIP	Well 1353 Well 1353	SJAO OPZ	20 — 150 0.001 — 20	
1985 program						
659	10.02.85	SIP	Well 1340 Well 1340 Well 1340	XIAO XIAO XIAO	0.001 - 20 0.001 - 20 20 - 150	
660	25.04.85	SIP	Well 1319 Well 1319	XIAO XIAO	20 — 150 20 — 150	
661	15.06.85	SIP	Well 1341 Well 1341 Well 1061bis	XIAO XIAO XIAO	20 - 150 0.001 - 20 0.001 - 20	
662	18.06.85	Tyumen region, RSFSR	"Benzol" Well	PV	2.5	
663	30.06.85	SIP	Well 1354 Well 1354	XIAO XIAO	0.001 — 20 20 — 150	
664	11.07.85	SIP	Adit 175-PP	XIAO	0.001 - 20	
665	19.07.85	SIP	Adit 901	XIAO	0.001 - 20	
666	19.07.85	Arkhangelsk region, RSFSR	"Agate" Well	PV	8.5	
667	20.07.85	SIP	Well 1322	XIAO	20 - 150	
668	25.07.85	SIP	Adit 152 Adit 152 Adit 152 Adit 152	XIAO XIAO IAR IAR	0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20	

N p/p	Date of the event	Venue	Conditions of the event	The purpose of the YI	Power, kt	Notes
1987 program						
669	26.02.87	SIP	Adit 130	FMI	0.001 - 20	
670	12.03.87	SIP	Well 1315 Well 1315	XIAO XIAO	0.001 — 20 0.001 — 20	

671	03.04.87	SIP	Well 1318	XIAO	20 - 150	
672	03.04.87	SIP	Adit 208 Adit 208 Adit 208	XIAO XIAO XIAO	0.001 - 20 0.001 - 20 0.001 - 20	
673	17.04.87	SIP	Well 1384 Well 1384 Well 1384	XIAO XIAO XIAO	20 - 150 0.001 - 20 0.001 - 20	
674	19.04.87	Perm region, RSFSR	"Helium" Well 404	PV	3.2	
675	19.04.87	Perm region, RSFSR	"Helium" Well 405	PV	3.2	
676	06.05.87	SIP	Adit 164	FMI	0.001 - 20	
677	06.06.87	SIP	Adit 138	FMI	0.001 - 20	
678	20.06.87	SIP	Well 1326 Well 1326	XIAO XIAO	20 — 150 0.001 — 20	
679	07.07.87	Yakut ASSR, RSFSR	"Neva" Well 68	PV	15	
680	17.07.87	SIP	Adit 168	FMI	20 - 150	
681	24.07.87	Yakut ASSR, RSFSR	"Neva" Well 61	PV	15	
682	02.08.87	SPNZ	Adit A-37A Adit A-37A Adit A-37A Adit A-37A Adit A-37A	XIAO XIAO FMI IAR	0.001 - 20 0.001 - 20 20 - 150 0.001 - 20 0.001 - 20	
683	02.08.87	SIP	Well 1348 Well 1348 Well 1348	XIAO XIAO XIAO	0.001 - 20 20 - 150 20 - 150	
684	12.08.87	Yakut ASSR, RSFSR	"Neva" Well 101	PV	3.2	
685	18.09.87	SIP	Adit 132P Adit 132P	IPF IAR	0.001 — 20 0.001 — 20	
686	03.10.87	Kazakh SSR	"Batholith" Well BT-2	PV (sz)	8.5	

687	16.10.87	SIP	Adit K-85	IPF	0.001 - 20	
688	11/15/87	SIP	Well 1332 Well 1332	XIAO XIAO	20 — 150 0.001 — 20	
689	13.12.87	SIP	Well 1355 Well 1355	XIAO XIAO	0.001 — 20 20 — 150	
690	20.12.87	SIP	Adit 164P	FMI	0.001 - 20	
691	27.12.87	SIP	Well 1388 Well 1388	XIAO XIAO	20 — 150 0.001 — 20	
1988 program						
692	06.02.88	SIP	Adit 168P Adit 168P Adit 168P	XIAO IAR IAR	0.001 - 20 < 0.001 < 0.001	
693	13.02.88	SIP	Well 1361 Well 1361	XIAO XIAO	20 — 150 0.001 — 20	
694	03.04.88	SIP	Well 1336	XIAO	20 - 150	
695	22.04.88	SIP	Adit 704	IPF	0.001 - 20	
696	04.05.88	SIP	Well 1359	FMI	20 - 150	
697	08.05.88	SPNZ	Adit A-24 Adit A-24 Adit A-24	IPF IPF IPF	20 - 150 0.001 - 20 0.001 - 20	
698	14.06.88	SIP	Well 1421	XIAO	0.001 - 20	
699	22.08.88	Tyumen region, RSFSR	“Rubin” Well RN-2	PV (sz)	15	
700	06.09.88	Arkhangelsk region, RSFSR	“Rubin” Well RN-1	PV (sz)	8.5	The last Soviet industrial nuclear explosion
701	14.09.88	SIP	Well 1350	FMI (SEC)	20 - 150	Joint experiment with the American side
702	18.10.88	SIP	Adit 034	IPF	0.001 - 20	
703	11/12/88	SIP	Well 1412	XIAO	0.001 - 20	

704	23.11.88	SIP	Adit 169/1 Adit 169/1 Adit 169/1	XIAO FMI IAR	0.001 - 20 0.001 - 20 < 0.001	
705	04.12.88	SPNZ	Adit A-27 Adit A-27 Adit A-27 Adit A-27 Adit A-27	XIAO XIAO IAP IAR	20 - 150 0.001 - 20 0.001 - 20 0.001 - 20 < 0.001	
706	12/17/88	SIP	Well 1346 Well 1346	XIAO XIAO	20 — 150 0.001 — 20	
707	28.12.88	SIP	Adit 901P Adit 901P	XIAO XIAO	0.001 — 20 0.001 — 20	
1989 program						
708	22.01.89	SIP	Well 1328 Well 1328	XIAO XIAO	0.001 — 20 20 — 150	
709	12.02.89	SIP	Well 1366	XIAO	20 - 150	
710	17.02.89	SIP	Adit 139	XIAO	0.001 - 20	
711	08.07.89	SIP	Well 1352	XIAO	20 - 150	
712	02.09.89	SIP	Well 1410 Well 1410	XIAO XIAO	0.001 — 20 0.001 — 20	
713	04.10.89	SIP	Adit 169/2	IPF	0.001 - 20	
714	10/19/89	SIP	Well 1365 Well 1365 Well 1365	XIAO XIAO XIAO	20 - 150 0.001 - 20 0.001 - 20	The last nuclear test at SIP
1990 program						
715	24.10.90	SPNZ	Adit A13-N Adit A13-N Adit A13-N Adit A13-N Adit A13-N Adit A13-N Adit A13-N	XIAO XIAO XIAO XIAO XIAO XIAO IAR	20 - 150 0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20 0.001 - 20 < 0.001 < 0.001 < 0.001	The last nuclear test of the USSR

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